

Attachment A

Curriculum vitae of John W. Mayo

VITA

JOHN W. MAYO

**Georgetown University
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ACADEMIC APPOINTMENTS:

Georgetown University, McDonough School of Business

Professor of Economics, Business and Public Policy 1998-present

Executive Director, Georgetown Center for Business and Public Policy, 2002 – present

Dean, 2002-2004

Senior Associate Dean, 1999-2001

Georgetown University, Department of Economics

Professor of Economics (by courtesy), 2011-present.

Stanford University

Visiting Scholar, February 2013, February 2015

Stanford Institute for Economic Policy Research

University of California, Berkeley

Visiting Scholar, January-May 2011

Haas School of Business

University of Tennessee, Knoxville

Professor of Economics, 1994-1998

Research Associate Professor, Center for Business and Economic Research 1989-1994

Associate Professor of Economics, Department of Economics, 1989-1994

Research Assistant Professor, Center for Business and Economic Research, 1981-1989

Assistant Professor of Economics, Department of Economics, September 1981-1989.

Virginia Polytechnic and State University (Virginia Tech)

Visiting Assistant Professor, fall 1983

EDUCATION:

Honorary Doctorate in Economics, 2007, University of Basel, Basel, Switzerland

Ph.D., Economics, 1982, Washington University in St. Louis

Dissertation: "Diversification and Performance in the U.S. Energy Industry"

A.M., Economics, 1979, Washington University in St. Louis

B.A., Economics, 1977, Hendrix College, Conway, Arkansas

FIELDS OF SPECIALIZATION:

Industrial Organization

Regulatory and Antitrust Policy

Applied Microeconomics

Econometrics

NON-ACADEMIC APPOINTMENTS

U.S. Senate, Small Business Committee

Chief Economist, Democratic Staff, June 1984 - June 1985

International Institute for Applied Systems Analysis (IIASA)

Energy Research Fellow, Laxenburg, Austria, summer 1979

Transportation and Public Utilities Group

President, 2005-2006; 2014-15.

National Safety Council,

Board of Directors, Vice President, October 2002- 2006.

HONORS, AWARDS, AND GRANTS:

Undergraduate: Mosley Economics Prize (#1 graduating economics major), Alpha Chi (scholastic), Blue Key Honor Society, Senior Honors Seminar.

Graduate: University Fellowship, Washington University (1977-78); National Academy of Sciences Young Research Fellow, Laxenburg, Austria (1979); President, Washington University Economics Graduate Student Association (1979-81); Dissertation Fellowship, Center for the Study of American Business, Washington University (1980-81).

Post-Graduate: Public Utility Research Center Distinguished Service Award (2006); Zaeslin Fellow of Law and Economics, University of Basel, Basel, Switzerland (2000 - present); William B. Stokely Scholar, College of Business Administration, The University of Tennessee (1993-1995); South Central Bell Research Grant (1988); Research Affiliate, Center of Excellence for New Venture Analysis, The University of Tennessee (1985); Summer Faculty Research Fellowships, The University of Tennessee (1983-1985).

COURSES TAUGHT:

Undergraduate: The Miracle of Markets?, Principles of Microeconomics, Economic Foundations of Commerce, Current Economic Problems, Government and Business, Intermediate Microeconomics, Energy Economics

Graduate: Managerial Economics (MBA), Firm Analysis and Strategy (MBA), Managing in a Regulated Economy (MBA), Economics (Executive MBA), The Economics of Strategy (MBA), Business and Public Policy (MBA), Competition and Competition Policy (MBA), Regulation and Deregulation in the American Economy (MBA), Strategic Pricing: Theory, Practice and Policy (MBA), Understanding International Business (MBA), Industrial Organization and Public Policy (Ph.D.), The Economics of Antitrust and Regulation (Ph.D.)

PUBLICATIONS:

A. JOURNAL ARTICLES

“Can you Hear me Now: Exit, Voice and Loyalty Under Increasing Competition” (with T. Randolph Beard and Jeffrey T. Macher). Journal of Law and Economics, forthcoming.

“Influencing Public Policymaking: Firm-, Industry- and Country Institution-Level Determinants,” (with Jeffrey T. Macher) Strategic Management Journal, forthcoming.

“Revenue Adequacy: the Good, the Bad and the Ugly” (with Jeffrey T. Macher and Lee F. Pinkowitz), Transportation Law Journal, Volume 41, 2014, pp. 85-127.

“The Evolution of Innovation and the Evolution of Regulation: Emerging Tensions and Emerging Opportunities in Communications” (with Larry Downes) CommLaw Conspectus: Journal of Communications Law and Policy, Vol. 23, 2014, pp. 10-51.

“Moving Past the Ideological Debate: A Results-Based Regulation Approach to Net Neutrality,” Democracy: A Journal of Ideas, No. 34, fall 2014, pp. 21-27.

“The Evolution of Regulation: 20th Century Lessons and 21st Century Opportunities,” Federal Communications Law Journal, Vol. 65, April 2013, pp. 119-156.

“It’s Time to Unify Telecommunications Policy” (with Jeffrey T. Macher), The Economists’ Voice, Vol. 9, 2012, pp. 1-6.

“The World of Regulatory Influence” (with Jeffrey T. Macher), Journal of Regulatory Economics, Volume 41, February 2012, pp. 59-79.

“Regulator Heterogeneity and Endogenous Efforts to Close the Information Asymmetry Gap: Evidence from FDA Regulation,” (with Jeffrey T. Macher and Jackson A. Nickerson), Journal of Law and Economics, Vol. 54, February 2011, pp. 25-54.

“From Network Externalities to Broadband Growth Externalities: A Bridge Not Yet Built” (with Scott Wallsten), Review of Industrial Organization, Vol. 38, March 2011, pp. 173-190.

“The Influence of Firms on Government” (with Jeffrey T. Macher and Mirjam Schiffer), The B.E. Journal of Economic Analysis & Policy, Vol. 11, Issue 1, January 2011, pp. 1-25.

“Making a Market Out of a Molehill?: Geographic Market Definition in *Aspen Skiing*,” (with Jeffrey T. Macher), Journal of Competition Law and Economics, Vol. 6, December 2010, pp. 911-926.

“Enabling Efficient Wireless Communications: The Role of Secondary Spectrum Markets” (with Scott Wallsten), Information Economics and Policy, Vol. 22, March 2010, pp. 61-72.

“Wireless Technologies,” (with Glenn Woroch), Information Economics and Policy, Vol. 22, March 2010, pp. 1-3.

“Endogenous Regulatory Constraints and the Emergence of Hybrid Regulation” (with Larry Blank), Review of Industrial Organization, Vol. 35, November 2009, pp. 233-255.

“Warm Glow and Charitable Giving: Why the Wealthy Do Not Give More to Charity” (with Catherine H. Tinsley), Journal of Economic Psychology, Vol. 30, June 2009, pp. 490-499.

“Common Costs and Cross-Subsidies: Misestimation Versus Misallocation” (with Mark L. Burton and David L. Kaserman), Contemporary Economic Policy, April 2009, pp. 193-199.

“It’s No Time to Regulate Wireless Telephony,” The Economists’ Voice, Vol. 5 : Iss. 1, pp. 1-4, 2008.

“Understanding Participation in Social Programs: Why Don’t Households Pick up the Lifeline?” (with Mark Burton and Jeffrey T. Macher), The B.E. Journal of Economic Analysis & Policy, Volume 7, Issue 1 (Topics), 2007.

“A Graphical Approach to the Stiglerian Theory of Regulation,” (with T. Randolph Beard and David L. Kaserman), Journal of Economic Education, Vol. 38, Fall 2007, pp. 447-451.

“Antitrust Economics Meets Antitrust Psychology: A View From the Firms” (with Mirjam Schiffer), International Journal of the Economics of Business, Vol. 13, July 2006, pp. 281-306.

“Regulatory Opportunism and Investment Behavior: Evidence from the U.S. Electric Utility Industry,” (with Thomas P. Lyon) RAND Journal of Economics, Vol. 36, Fall 2005, pp. 628-644.

Reprinted in The Political Economy of Regulation, Thomas P. Lyon, Edward Elgar, Northampton, MA, 2007.

"On the Impotence of Imputation" (with T. Randolph Beard and David L. Kaserman), Telecommunications Policy, Volume 27, Issues 8-9, September-October 2003, pp. 585-595.

"A Graphical Exposition of the Economic Theory of Regulation" (with T. Randolph Beard and David L. Kaserman), Economic Inquiry, Volume 41, October 2003, pp. 592-606.

"Regulation, Competition, and the Optimal Recovery of Stranded Costs," (with T. Randolph Beard and David L. Kaserman) International Journal of Industrial Organization, Volume 21, June 2003, pp. 831-848.

"The Supreme Court Weighs in on Local Exchange Competition: The Meta-Message," (with David L. Kaserman) Review of Network Economics Volume 1, September 2002, pp. 119 – 131.

"Regulation, Vertical Integration and Sabotage" (with T. Randolph Beard and David L. Kaserman), Journal of Industrial Economics, Volume 49, September 2001, pp. 319-334.

"Efficient Telecommunications Policies for the 'New Economy': The Compelling Case for Access Charge Reform" (with David L. Kaserman), International Journal of Development Planning Literature, (Special Issue edited by William J. Baumol and Victor A. Becker), Volume 1, April 2001.

"Regulatory Policies Toward Local Exchange Companies Under Emerging Competition: Guardrails or Speedbumps on the Information Highway," (with David L. Kaserman) Information Economics and Policy, Volume 11, December 1999, pp. 367-388.

"Open Entry and Local Telephone Rates: The Economics of IntraLATA Toll Competition," (with David L. Kaserman, Larry R. Blank, and Simran Kahai) Review of Industrial Organization, Vol. 14, June 1999, pp. 303-319.

"Modeling Entry and Barriers to Entry: A Test of Alternative Specifications," (with Mark L. Burton and David L. Kaserman), Antitrust Bulletin, Summer 1999, pp. 387-420.

"Targeted and Untargeted Subsidy Schemes: Evidence from Post-Divestiture Efforts to Promote Universal Telephone Service," (with Ross Eriksson and David L. Kaserman) Journal of Law and Economics, Vol. 41, October 1998, pp. 477-502.

"Dominant Firm Pricing with Competitive Entry and Regulation: The Case of IntraLATA Toll," (with Larry Blank and David L. Kaserman) Journal of Regulatory Economics, Vol. 14, July 1998, pp. 35-54.

"The Role of Resale Entry in Promoting Local Exchange Competition," (with David L. Kaserman) Telecommunications Policy, Vol. 22, No. 4/5, 1998.

"Telecommunications Policy and the Persistence of Local Exchange Monopoly," (with David L. Kaserman), Business Economics, Vol. 33, April 1998, pp. 14-19.

"An Efficient Avoided Cost Pricing Rule for Resale of Local Exchange Telephone Service," (with David L. Kaserman) Journal of Regulatory Economics, Volume 11, January 1997, pp. 91-107.

"A Dynamic Model of Advertising by the Regulated Firm," (with Francois Melese and David L. Kaserman) Journal of Economics (Zeitschrift für Nationalökonomie), Volume 64, 1996, pp. 85-106.

"Is the 'Dominant Firm' Dominant? An Empirical Analysis of AT&T's Market Power," (with Simran Kahai and David L. Kaserman), Journal of Law and Economics, Volume 39, October 1996, pp. 499-517.

"Competition and Asymmetric Regulation in Long Distance Telecommunications: An Assessment of the Evidence," (with David L. Kaserman) CommLaw Conspectus: Journal of Communications Law and Policy, Volume 4, Winter 1996, pp. 1-26.

"Deregulation and Predation in Long-Distance Telecommunications: An Empirical Test," (with Simran Kahai and David L. Kaserman), Antitrust Bulletin, Vol. 40, Fall 1995, pp. 645-666.

"Cross-Subsidies in Telecommunications: Roadblocks on the Road to More Intelligent Telephone Pricing" (with David L. Kaserman), Yale Journal on Regulation, Volume 11, Winter 1994, pp. 120-147.

Reprinted in Public Utilities Law Anthology, Allison P. Zabriskie, editor, Vol. 17, Part 2 (July-December, 1994), pp. 899-929.

"Demand and Pricing of Telephone Services: Evidence and Welfare Implications" (with Carlos Martins-Filho), RAND Journal of Economics, Volume 24, Autumn 1993, pp. 399-417.

"Two Views of Applied Welfare Analysis: The Case of Local Telephone Service Pricing -- A Comment and Extension" (with David L. Kaserman and David M. Mandy), Southern Economic Journal, Volume 59, April 1993, pp. 822-827.

"The Political Economy of Deregulation: The Case of Intrastate Long Distance" (with David L. Kaserman and Patricia L. Pacey), Journal of Regulatory Economics, Volume 5, March 1993, pp. 49-64.

Reprinted in The Foundations of Regulatory Economics, Robert E. Ekelund, Jr. (Ed.), Edward Elgar Publishing, Northampton, MA.

"Demand, Pricing and Regulation: Evidence from the Cable TV Industry" (with Yasuji Otsuka), RAND Journal of Economics, Volume 22, Number 3, Autumn 1991, pp. 396-410.

"The Measurement of Vertical Economies and the Efficient Structure of the Electric Utility Industry" (with David L. Kaserman), Journal of Industrial Economics, Volume 39, Number 5, September 1991, pp. 483-502.

"Regulation, Market Structure and Hospital Costs: Reply and Extension" (with Deborah A. McFarland), Southern Economic Journal, Volume 58, Number 2, October 1991, pp. 535-538.

"Firm Size, Employment Risk and Wages: Further Insights on a Persistent Puzzle" (with Matthew N. Murray), Applied Economics, Volume 23, Number 8, August 1991, pp. 1351-1360.

"Competition for 800 Service: An Economic Evaluation" (with David L. Kaserman), Telecommunications Policy, October 1991, pp. 395-408.

"Regulation, Advertising and Economic Welfare" (with David L. Kaserman), Journal of Business, Volume 64, Number 2, April 1991, pp. 255-267.

Reprinted in The Foundations of Regulatory Economics, Robert E. Ekelund, Jr., (Ed.), Edward Elgar Publishing, Northampton, MA.

"Cross-Subsidization in Telecommunications: Beyond the Universal Service Fairy Tale" (with David L. Kaserman and Joseph E. Flynn), Journal of Regulatory Economics, Volume 2, Number 3, September 1990, pp. 231-250.

"Barriers to Trade and the Import Vulnerability of U.S. Manufacturing Industries" (with Don P. Clark and David L. Kaserman), Journal of Industrial Economics, Volume 38, Number 4, June 1990, pp. 433-448.

"Firm Entry and Exit: Causality Tests and Economic Base Linkages" (with Joseph E. Flynn), Journal of Regional Science, Volume 29, Number 4, November 1989, pp. 645-662.

"Regulation, Market Structure and Hospital Costs" (with Deborah A. McFarland), Southern Economic Journal, Volume 55, Number 3, January 1989, pp. 559-569.

"Long Distance Telecommunications Policy: Rationality on Hold" (with David L. Kaserman), Public Utilities Fortnightly, Volume 122, Number 13, December 22, 1988, pp. 18-27.

"The Effects of Regulation on R&D: Theory and Evidence" (with Joseph E. Flynn), Journal of Business, Volume 61, Number 3, July 1988, pp. 321-336.

"The Effectiveness of Mandatory Fuel Efficiency Standards in Reducing the Demand for Gasoline" (with John E. Mathis), Applied Economics, Volume 20, Number 2, February 1988, pp. 211-220.

"Market Based Regulation of a Quasi-Monopolist: A Policy Proposal for Telecommunications" (with David L. Kaserman), Policy Studies Journal, Volume 15, Number 3, March 1987, pp. 395-414.

"The Ghosts of Deregulated Telecommunications: An Essay by Exorcists" (with David L. Kaserman), Journal of Policy Analysis and Management, Volume 6, Number 1, Fall 1986, pp. 84-92.

"Economies of Scale and Scope in the Electric-Gas Utilities: Further Evidence and Reply," Southern Economic Journal, Volume 52, Number 4, April 1986, pp. 1175-1178.

"Advertising and the Residential Demand for Electricity" (with David L. Kaserman), Journal of Business, Volume 58, Number 4, October 1985, pp. 399-408.

"Multiproduct Monopoly, Regulation and Firm Costs," Southern Economic Journal, Volume 51, Number 1, July 1984, pp. 208-218.

"The Technological Determinants of the U.S. Energy Industry Structure," The Review of Economics and Statistics, Volume 66, February 1984, pp. 51-58.

B. BOOKS, MONOGRAPHS, AND OTHER PUBLICATIONS

"Staying with Success? Not at the FCC," Forbes, February 26, 2015.

"Bringing Mobile Broadband to Rural Americans," (with Anna-Maria Kovacs) Roll Call, May 9, 2014.

"Modernized Telecom Policy Must Reflect That Change is the Only Constant," Roll Call, February 7, 2014.

"Conclusion" in The Information Technology Revolution and the Transformation of the Small Business Economy: A Collection of Essays, The American Consumer Institute, March 2012

"How to Regulate the Internet Tap," (with Bruce Owen, Marius Schwartz, Robert Shapiro, Lawrence J. White and Glenn Woroch) New York Times, April 21, 2010, p. A25.

"Regulating Early Termination Fees: When 'Pro-Consumer' Legislation Isn't," Economic Policy Vignette, Georgetown Center for Business and Public Policy, January 2010, available at <http://cbpp.georgetown.edu/publications/>.

"Universal Service: Can We Do More with Less?" in New Directions in Communications Policy, Randolph J. May, Editor, Carolina Academic Press, 2009.

"The Economic Facts and FAQs of National Video Franchising: Reflections on the House of Representatives Debate," Policy Matters 06-16, AEI-Brookings Joint Center, June 2006.

"We're all for Competition, But...", Policy Matters 06-03, AEI-Brooking Joint Center, February 2006.

"The Role of Antitrust in a Deregulating Telecommunication Industry: The Economic Fallacies of Trinko," in The Future of Telecommunications Industries, Arnold Picot, Editor, Springer Verlag, 2006, pp. 129-146.

"Competition in the Long Distance Market," (with David L. Kaserman) in Handbook of Telecommunications Economics, Martin E. Cave, Sumit K. Majumdar and Ingo Vogelsang, Editors, North Holland Elsevier, 2002.

"Shakeout or Shakedown? The Rise and Fall of the CLEC Industry," (with Mark Burton and David L. Kaserman), in Michael A. Crew, Editor, Markets, Pricing, and Deregulation of Utilities, Kluwer Academic Publishers, 2002.

"Resale and the Growth of Competition in Wireless Telephony," (with Mark L. Burton and David L. Kaserman), in Expanding Competition in Regulated Industries, Michael A. Crew, Editor, Kluwer Academic Publishers, 2000.

"Monopoly Leveraging, Path Dependency, and the Case for a Competition Threshold for RBOC Reentry into InterLATA Toll," (with T.R. Beard and David L. Kaserman), in Regulation Under Increasing Competition, Michael A. Crew, Editor, Kluwer Academic Publishers, 1999.

"The Quest for Universal Service: The Misfortunes of a Misshapen Policy," (with David L. Kaserman) in Telecommunications Policy: Have Regulators Dialed the Wrong Number?, Donald L. Alexander, Editor, Praeger Publishing Group, Westport, CT, 1997, pp.131-144.

Government and Business: The Economics of Antitrust and Regulation (with David L. Kaserman), The Dryden Press, Harcourt Brace College Publishers, 1995.

"Long-Distance Telecommunications: Expectations and Realizations in the Post-Divestiture Period" (with David L. Kaserman), in Incentive Regulation for Public Utilities, Michael A. Crew, Editor, (Boston, MA.: Kluwer Academic Publications), 1994.

Monopoly Leveraging Theory: Implications for Post-Divestiture Telecommunications Policy (with David L. Kaserman), Center for Business and Economic Research: University of Tennessee, April 1993.

State-Level Telecommunications Policy in the Post-Divestiture Era: An Economic Perspective (with William F. Fox), Center for Business and Economic Research, University of Tennessee, March 1991.

A review of After Divestiture: The Political Economy of State Telecommunications Regulation, by Paul E. Teske. Albany: State University of New York Press, 1990. Publius, Winter 1991, pp. 164-166.

Deregulation and Market Power Criteria: An Evaluation of State Level Telecommunications Policy" (with David L. Kaserman) in Telecommunications Deregulation: Market Power and Cost Allocation Issues, J. Allison and D. Thomas (eds.), Quorum Books, 1990.

The Economics of Local Telephone Pricing Options (with J. E. Flynn), Center for Business and Economic Research, The University of Tennessee, October 1988.

Firm Entry and Exit: Economic Linkages in Tennessee (with J. E. Flynn), Center for Business and Economic Research, The University of Tennessee, Knoxville, July 1988.

"The Economics of Regulation: Theory and Policy in the Post-Divestiture Telecommunications Industry" (with David L. Kaserman) in Public Policy Toward Corporations, Arnold Heggestad, editor, University of Florida Presses, 1988.

"Entries and Exits of Firms in the Tennessee Economy: Foundations for Research," Survey of Business, The University of Tennessee, Vol. 23, Summer 1987, pp. 21-23.

"The Relationship of Manufacturing and Nonmanufacturing Firm Entry and Exit in Tennessee" (with Joseph E. Flynn), Survey of Business, The University of Tennessee, Volume 23, Number 2, Fall 1987, pp. 11-16.

A Review of Municipal Ownership in the Electric Utility Industry, by David Schap. New York: Praeger Publishing Company, 1986. Southern Economic Journal, Volume 54, Number 1, July 1987.

Entries and Exits of Firms in the Tennessee Economy (with W. F. Fox, et al.), Center for Business and Economic Research, University of Tennessee, Knoxville, May 1987.

Condensed report published in Survey of Business, The University of Tennessee, Volume 23, Number 2, Fall 1987, pp. 3-10.

"The U.S. Economic Outlook," Survey of Business, The University of Tennessee, annual contributor, 1986-1994.

An Economic Report to the Governor of the State of Tennessee, Center for Business and Economic Research and the Tennessee State Planning Office, Annual Contributor, 1981-1994.

"An Economic Analysis of a Monitored Retrievable Storage Site for Tennessee" (with W. F. Fox, L. T. Hansen, and K. E. Quindry), Final Report and Appendices, December 17, 1985.

CONGRESSIONAL AND REGULATORY TESTIMONIES:

U.S. Senate (Commerce, Science and Transportation Committee; Energy and Natural Resources Committee, Subcommittee on Water and Power); Federal Communications Commission; U.S. International Trade Commission; Tennessee State Legislature (Senate Finance, Ways and Means Committee; Special Joint Legislative Committee on Business Taxation; and, Senate State and Local Government Committee); Maryland State Legislature (Environmental Works Committee); Pennsylvania Public Utility Commission; Michigan Public Service Commission; Missouri Public Service Commission; Illinois Commerce Commission; West Virginia Public Utility Commission; Wyoming Public Utility Commission; Washington Utilities and Transportation Commission; Utah Public Service Commission; Wisconsin Public Service Commission; California Public Utilities Commission; Florida Public Service Commission; Delaware Public Service Commission; Montana Public Service Commission; Maryland Public Service Commission; Massachusetts Department of Public Utilities; Georgia Public Service Commission; Colorado Public Utilities Commission; North Carolina Public Utilities Commission; Missouri Public Service Commission; Texas Public Utility Commission; Arkansas Public Service Commission; Connecticut Department of Public Utility Control; Kansas State Corporation Commission; and New Jersey Board of Public Utility Commissioners.

INVITED SEMINARS AND SELECTED CONFERENCE PRESENTATIONS:

Columbia University, University of Chicago, London Business School, University of Paris (Dauphine IX), Vanderbilt University, INSEAD, Washington University in St. Louis, University of Michigan, Ohio State University, University of Minnesota, University of Florida, University of Arkansas, University of Texas, University of Missouri, Florida State University, Rutgers University, American University, University of Missouri, Kansas University, University of Utah, University of Colorado, University of Basel (Switzerland), University of Freiburg (Germany), University of Central Florida, American Enterprise Institute, Brookings Institution, Federal Communications Commission, Australian Competition and Consumer Commission (ACCC), Telecommunications Policy Research Conference (TPRC), National Conference of State Legislatures, U.S. Advisory Commission on Intergovernmental Relations

SELECTED CONSULTING:

U.S. Department of Justice, Antitrust Division; U.S. Federal Trade Commission; AT&T; Sprint; MCI Telecommunications; Verizon; Optus Communications (Australia); United Parcel Service; Commonwealth of Virginia, Tennessee Valley Authority; Antitrust Division, Office of the Attorney General, State of Tennessee; U.S. Senator Howard Baker, Jr., U.S. Senate Majority Leader; Oak Ridge National Laboratory; AmerenUE; Arkansas Consumer Research; Division of Energy Conservation and Rate Advocacy, Office of the Arkansas Attorney General; U.S. Department of Energy

PROFESSIONAL PRESENTATIONS:

American Economic Association Annual Conference, Western Economic Association Annual Conference, Southern Economic Association Annual Conference, European Association for Research in Industrial Economics Annual Conference, Center for Research in Regulated Industries Eastern Annual Conference, Center for Research in Regulated Industries Western Annual Conference, Southeastern Economic Analysis Conference

WORKING PAPERS:

“Demand in a Portfolio Choice Environment: The Evolution of Telecommunications” (with Jeffrey T. Macher, Olga Ukhaneva and Glenn Woroch), October 2014.

“Targeting Efforts to Raise Rivals’ Costs: Moving from ‘Whether’ to ‘Whom’” (with David M. Mandy and David E.M. Sappington), January 2105.

“When Do Auctions Ensure the Welfare-Maximizing Allocation of Scarce Inputs?” (with David E.M. Sappington), December 2014

“Now It’s Getting Personal: Universal Service in a Wireless World,” (with Jeffrey T. Macher Olga Ukhaneva and Glenn Woroch), December 2104

“International Telecommunications Demand” (with Olga Ukhaneva), March 2015.

EDITORIAL REVIEWER:

National Science Foundation, Brookings Institution, Federal Trade Commission, The MIT Press, American Economic Review, Quarterly Journal of Economics, Journal of Law and Economics, Economic Journal, Journal of Business, RAND Journal of Economics, Journal of Regulatory Economics, Review of Economics and Statistics, Economic Inquiry, Journal of Industrial Economics, Journal of Economics & Management Strategy, Journal of Law, Economics and Organization, Journal of Economic Behavior and Organization, Review of Industrial Organization, Scandinavian Journal of Economics, Eastern Economic Journal, Southern Economic Journal, Contemporary Economic Policy, Economic Development and Cultural Change, Industrial Relations, Growth and Change, Review of Regional Studies, Journal of Economics and Business, Quarterly Review of Economics and Business, Journal of Policy Analysis and Management, Quarterly Journal of Business and Economics, Regional Science and Urban Economics, Financial Review, Journal of Money, Credit, and Banking, Social Science Quarterly, Telecommunications Systems, Public Finance Quarterly, Japan and the World Economy, Energy Economics, Information Economics and Policy

EDITORIAL AND ACADEMIC OVERSIGHT BODIES

Associate Editor, Information Economics and Policy, 2007-2011.

Editorial Board, Journal of Regulatory Economics, 1999-present.

Editorial Board, Review of Industrial Organization, 2002-2003; 2010-present.

Associate Editor, Economic Inquiry, 2013-present.

Board of Academic Advisors, The Free State Foundation, 2008 – 2009.

Research Advisory Committee, National Regulatory Research Institute (Ohio State University), 1993-1997.

PROFESSIONAL MEMBERSHIPS:

American Economic Association

Western Economic Association

Southern Economic Association

American Law and Economics Association

International Telecommunications Society

European Association for Research in Industrial Economics

Attachment B

Jeffrey T. Macher, John W. Mayo & Lee F. Pinkowitz, “*Revenue Adequacy: The Good, the Bad and the Ugly*”, 41 Transp. L.J. 85, 85-127 (2014).

Article

Revenue Adequacy: The Good, the Bad and the Ugly

Jeffrey T. Macher, John W. Mayo, and Lee F. Pinkowitz*

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Abstract: The concept of “revenue adequacy” made its way into the legal governance of the rail industry prior to the industry’s substantial deregulation via the Staggers Rail Act in 1980. This seemingly quiet feature of rail legislation has, however, increasingly grown central to the regulatory-deregulatory fault line in the 21st century rail industry. This paper examines the concept of revenue adequacy, a benchmark of United States railroad firms’ financial performance calculated annually by regulatory oversight bodies. The paper addresses questions around the origins, measurement, informational provisions, value and policy benefits and costs of revenue adequacy. An examination of the historical origins, measurement, and informational provisions of revenue adequacy generates insights into the motivations for and limitations of this concept. A financial benchmarking exercise assesses revenue adequacy in the rail industry relative to both a narrowly defined set of comparable industries and a broader set of publicly-traded non-financial companies operating in the U.S, and indicates little differentiates railroads from these comparison sets over the past dozen years. A nonfinancial examination assesses whether the railroad industry has made continued rail transportation system improvements given its regulatory governance structure, and concludes that significant strides toward the goal of achieving a “safe, adequate, economical, efficient, and financially stable Rail transportation system” as established in the Staggers Rail Act have been made. The paper concludes with policy reflections that identify prospective good, bad and ugly applications of revenue adequacy.

I. INTRODUCTION

The public policy spotlight shone brightly on the U.S. rail industry in 1980, as both its financial footing and physical infrastructure were deteriorating.¹ As previous policy attempts to “right the ship” had been unsuccessful, Congress passed and President Jimmy Carter signed the Staggers Rail Act in October of that year. President Carter commented when signing the legislation:

In recent decades the problems of the railroad industry have become severe. Its 1979 rate of return on net investment was 2.7 percent, as compared to over ten percent for comparable industries. We have seen a number of major railroad bankruptcies and the continuing expenditure of billions of Fed-

1. See generally Clifford Winston, *The Success of the Staggers Rail Act of 1980*, AEI-BROOKINGS JOINT CTR. FOR REGULATORY STUDIES (Oct. 2005), http://www.brookings.edu/~media/research/files/papers/2005/10/railact%20winston/10_railact_winston.pdf; see also ICC *Ratemaking in Noncompetitive Markets—Oversight: Hearing Before the Subcomm. on Oversight & Investigations of the H. Comm. on Interstate & Foreign Commerce*, 96th Cong. 7 (1980) (statement of Darius W. Gaskins, Chairman, Interstate Commerce Comm’n) (“the railroad industry is financially in very dire circumstances”).

eral dollars to keep railroads running. Service and equipment have deteriorated. A key reason for this state of affairs has been overregulation by the Federal Government. At the heart of this legislation is freeing the railroad industry and its customers from such excessive control.²

The Staggers Act fundamentally altered the governance structure of the rail industry, shifting from a highly granular model of regulation to a model in which markets, rather than regulators and rate bureaus, were largely responsible for establishing prices and investment. President Carter further observed:

By stripping away needless and costly regulation in favor of marketplace forces wherever possible, this act will help assure a strong and healthy future for our Nation's railroads and the men and women who work for them. It will benefit shippers throughout the country by encouraging railroads to improve their equipment and better tailor their service to shipper needs. America's consumers will benefit, for rather than face the prospect of continuing deterioration of rail freight service, consumers can be assured of improved railroads delivering their goods with dispatch.³

The initial implementation of the Staggers Act was problematic for all actors, however, as it shifted the burden of enforcement from the ICC to third parties (mostly shippers) who were now responsible for lodging complaints against market rates that they deemed unfair as opposed to the ICC regulating rates before they came to market.⁴ Rail system improvements nevertheless began in earnest after the Staggers Act's passage, with the ensuing benefits from deregulation provided to both railroads and shippers.⁵ The subsequent turnaround of the rail industry has been remarkable and is well documented.⁶ Deregulation eventually allowed rail carriers to make critical changes to rail operations, imple-

2. Presidential Statement on Signing S. 1946 into Law, 3 PUB. PAPERS 2229 (Oct. 14, 1980), available at <http://quod.lib.umich.edu/p/ppotpus/4732203.1980.003/299?page=root;size=100;view=image>.

3. *Id.*

4. Ernest W. Williams, Jr., *A Critique of the Staggers Rail Act of 1980*, 21 TRANSP. J. 5, 11 (1982).

5. A representative of the Post-Staggers' feedback, at a House oversight hearing in 1987, an advocate of the shipper organization the Committee Against Revising Staggers, testified that: "The Staggers Act has worked well for us since its enactment in 1980. We have found that the railroads, like most of our other vendors, are tough, but not impossible negotiators. We've hardly gained everything we've asked for, but we've benefitted from the restoration of decent rail service, and innovations in operations and marketing." *Staggers Rail Act Oversight: Hearings before the Subcomm. on Transp., Tourism, & Hazardous Materials of the Comm. on Energy & Commerce*, 100th Cong. 13-14 (1987) (statement of Robert E. Ferguson, Manager, Proctor & Gamble Co.).

6. See, e.g., Henry McFarland, *The Effects of United States Railroad Deregulation on Shippers, Labor and Capital*, 1 J. REG. ECON. 259 (1989); see generally Winston, *supra* note 1; Gerard J. McCullough & Louis S. Thompson, *A Further Look at the Staggers Rail Act: Mining the Available Data*, 6 RES. TRANSP. BUS. & MGMT. 3 (2013) (analyzing previously unpublished data to

ment flexible pricing rates (e.g., multiple car rates and contract rates) and introduce new technologies, resulting in substantial cost savings. Econometric estimates of rail cost data have found that “cost savings were tremendous . . . up to 40 percent lower than they would have been under regulation.”⁷ And corresponding productivity gains in the rail industry post-Staggers Act have substantially exceeded the productivity gains in other transportation industries—including trucking, which similarly deregulated in 1980—as well as the larger private-sector economy.⁸

As the fortunes of railroad firms turned, so too did the fortunes of shippers and consumers. The Staggers Act not only affected the supply of rail services, but also changed shipper responsiveness to rates and competitive alternatives. Artificially high rates for certain commodities were imposed on shippers pre-Staggers Act, whereas railroads were able to adjust rates in response to competition from other market alternatives post-Staggers Act.⁹ The result was that “the shippers of higher-valued commodities have benefitted most from Staggers. It is equally apparent, however, that these significant gains did not arrive on the back of bulk commodity shippers. Rather, shippers of nearly all commodities have, to some degree, benefitted from lower rates as a consequence of railroad deregulation.”¹⁰ Adjusted for inflation and exogenous fuel costs, real rail rates dropped steadily from the passage of the Staggers Act through 2004. While these rates have risen since 2004 from historic lows, they are still below 1980 levels in 2014.¹¹ A 2009 Surface Transportation Board (STB)-commissioned study indicates, moreover, that rising railroad input prices (i.e., fuel) and declining productivity growth—rather than enhanced railroad market power—account for the bulk of the recent rate increases.¹²

By 1995, the Senate Commerce Committee declared, “[t]he Staggers

reveal that rate reductions have been larger than revealed previously through studies utilizing only publicly available data).

7. Wesley W. Wilson, *Cost Savings and Productivity in the Railroad Industry*, 11 J. REG. ECON. 21, 21 (1997); see also Winston, *supra* note 1, at 8-9 (estimating that operating costs per ton mile fell by more than 50 percent from 1980 to 2002).

8. See generally B. KELLY EAKIN & PHILIP E. SCHOECH, CHRISTENSEN ASSOCS., *THE DISTRIBUTION OF THE POST-STAGGERS ACT RAILROAD PRODUCTIVITY GAINS* (2010), available at https://econweb.tamu.edu/common/files/workshops/PERC%20Applied%20Microeconomics/2011_2_9_Kelly_Eakin.pdf.

9. Mark L. Burton, *Railroad Deregulation, Carrier Behavior, and Shipper Response: A Disaggregated Analysis*, 5 J. REG. ECON. 417, 433 (1993).

10. *Id.* See generally Wesley W. Wilson, *Market-Specific Effects of Rail Deregulation*, 62 J. INDUS. ECON. 1 (1994).

11. Douglas W. Caves et al., *The Staggers Act, 30 Years Later*, 33 REG. 28, 30 (2011); see *infra* Figure 12.

12. KELLY EAKIN ET AL., CHRISTENSEN ASSOCS., *EXECUTIVE SUMMARY: A STUDY OF COMPETITION IN THE U.S. FREIGHT RAILROAD INDUSTRY AND ANALYSIS OF PROPOSALS THAT MIGHT ENHANCE COMPETITION* 16-17 (2009), <http://www.stb.dot.gov/stb/docs/Competition-Study/Executive%20Summary.pdf>.

Act is considered the most successful rail transportation legislation ever produced, resulting in the restoration of financial health to the rail industry.”¹³ Congress consequently took the additional step of further easing regulatory constraints—with President Clinton’s support—by eliminating the Interstate Commerce Commission (ICC) and replacing it with the current STB. Importantly, the bill transferred authority from the ICC to the STB and “carefully avoided alteration of the fundamental premises of the Staggers Act.”¹⁴

With these successes, the lenses of economists and public policymakers that were focused so intently on railroads prior to industry deregulation shifted elsewhere.¹⁵ Little noticed in the transition from a largely regulated to a largely deregulated environment, however, was “revenue adequacy” language first embedded in the 1976 Railroad Revitalization and Regulatory Reform Act (4R Act) and later retained with the Staggers Act.¹⁶ In particular, the “Adequate Revenue Levels” section charged the ICC with the task of developing “standards and procedures for the establishment of revenue levels adequate . . . to cover total operating expenses, including depreciation and obsolescence, plus a fair, reasonable, and economic profit or return (or both) on capital employed in the business.”¹⁷

In the wake of this statutory language, the ICC and (later) the STB have dutifully provided annual quantitative measures of individual railroads’ “revenue adequacy” based on STB-developed formulas that we describe below. STB calculations in most early years found Class I railroads were predominantly “revenue inadequate.”¹⁸ More recent STB calculations reveal that some railroads achieved STB’s determination of “revenue adequacy”—in particular, in 2011 and 2012.¹⁹ Definitional questions remain, however, as to what achieving revenue adequacy over a relevant time period actually means. This upward trend in revenue ade-

13. S. REP. NO. 104-176, at 3 (1995).

14. *Id.* at 7.

15. See, e.g., Edward I. Altman, Predicting Railroad Bankruptcies in America, 4 *BELL J. ECON. & MGMT. SCI.* 184 (1973); Kenneth D. Boyer, Minimum Rate Regulation, Modal Split Sensitivities, and the Railroad Problem, 85 *J. POL. ECON.* 493 (1977); Zvi Griliches, Cost Allocation in Railroad Regulation, 3 *BELL J. ECON. & MGMT. SCI.* 26 (1972); Richard C. Levin, Railroad Rates, Profitability, and Welfare under Deregulation, 12 *BELL J. ECON.* 1 (1981).

16. See Railroad Revitalization and Regulatory Reform Act of 1976, Pub. L. No. 94-210, § 101(b), 90 Stat. 33 (codified as amended in 45 U.S.C. § 801(b)(6) (2014)).

17. Railroad Revitalization and Regulatory Reform Act § 205, 90 Stat. 41.

18. See e.g., U.S. GOV’T ACCOUNTABILITY OFFICE, GAO/RCED-87-15BR, RAILROAD REVENUES: ANALYSIS OF ALTERNATIVE METHODS TO MEASURE REVENUE ADEQUACY 8 (1986).

19. See Railroad Revenue Adequacy—2011 Determination, S.T.B. Ex Parte No. 552 (Sub-No. 16) (Oct. 15 2012); Railroad Revenue Adequacy—2012 Determination, S.T.B. Ex Parte No. 552 (Sub-No. 17) (Sept. 30, 2013).

quacy and more generally the financial health of railroads have nevertheless provoked newfound economic and public policy attention, and even calls for revisiting the railroad industry's governance structure created by the Staggers Act.²⁰

In light of both the passage of time and the newfound policy attention directed toward the emergent financial health of the railroad industry, this paper examines revenue adequacy from an economic perspective by addressing the following questions: First, what is the origin of revenue adequacy? Second, how have regulators chosen to measure revenue adequacy? Third, how does revenue adequacy relate, if at all, to other relevant economic metrics that guide policy governance decisions? Fourth, does revenue adequacy measure economic value, either in concept or practice? And fifth, as the railroad industry moves forward what use, if any, might exist for revenue adequacy in policy oversight?

The rest of the paper is organized as follows: Section II provides a discussion of the historical context and origins of revenue adequacy to generate insights into the motivations for and limits of this concept. Section III examines the measurement of revenue adequacy and the evolving uses to which revenue adequacy has been put. Section IV discusses revenue adequacy in an economics context, with particular emphasis on what it is (i.e., what economic information it conveys) and what it is not (i.e., what economic information it does not convey). Section V undertakes an empirical benchmarking exercise, providing an assessment of revenue adequacy in the rail industry relative to both a narrowly defined set of comparable industries and a broader set of publicly-traded, non-financial companies operating in the United States. Section VI provides an assessment of whether revenues have been adequate in the post-Staggers era to provide for the Act's call for a "safe and efficient" rail transportation system. Section VII offers policy reflection on the revenue adequacy concept by adopting the taxonomy suggested by the classic spaghetti Western movie "The Good, the Bad and the Ugly." Section VIII offers concluding remarks.

II. THE ORIGINS OF REVENUE ADEQUACY

It is clear that the origins of the current statutory language regarding revenue adequacy stem from the languishing economic condition of the rail industry in the 1970s. As early as 1973, economists had identified a variety of underlying factors contributing to the industry's bleak financial condition,

20. See, e.g., STAFF OF S. COMM. ON COMMERCE, SCI., & TRANSP., 113TH CONG., UPDATE ON THE FINANCIAL STATE OF THE CLASS I FREIGHT RAIL INDUSTRY (Nov. 21, 2013), http://www.commerce.senate.gov/public/?a=Files.Serve&File_id=3cf1b5f2-9487-4c9c-9cea-efb9eb5499d7. Additionally, legislation is routinely sponsored by particular members of Congress in attempts to reregulate the industry. See, e.g., S. 49, 112th Cong. § 1 (2011).

including: (1) inflexible price and cost structures; (2) high fixed costs and high leverage; (3) excess capacity; (4) rigid labor and worker conditions; (5) negligible technological investments; and (6) antiquated management.²¹ While some of these factors—such as high fixed costs—are independent of the policy environment in the industry, other factors—such as inflexible prices and cost structures—were direct products of the pervasive industry regulatory constraints imposed. An analysis of the early governance structure of the railroad industry observed: An organization of the industry in which firms were free to quote prices, to enter or leave the industry, and to diversify, but not to collude, is diametrically opposite the present organization of the transportation industry.²²

Recognizing the troubled state of the nation's railroads, Congress passed the Regional Rail Reorganization Act (3R Act) in 1973.²³ The stated purpose of the 3R Act was to reorganize railroads in the Midwest and Northeast regions into an "economically viable system capable of providing adequate and efficient rail service", by not only providing federal assistance to ailing railroads, but also establishing the United States Railway Association (USRA) and the Consolidated Rail Corporation (Conrail).²⁴ USRA was intended to take over some powers of the ICC by allowing bankrupt railroads to abandon unprofitable lines. Conrail was intended to take over bankrupt railroads in the Northeast—effectively nationalizing a portion of the rail industry and giving Congress a greater stake in the long-term viability of the nation's railroads.

Despite the passage of the 3R Act and the creation of USRA and Conrail, the solvency problems facing the nation's railroads continued. The public stake in Conrail and its own viability precipitated additional political pressure that further action was necessary. Congress subsequently passed the 4R Act in 1976, which sought to directly take on the industry revitalization challenges:

It is the purpose of the Congress in this Act to provide the means to rehabilitate and maintain the physical facilities, improve the operations and structure, and restore the financial stability of the railways system of the United States, and to promote the revitalization of such railway system, so that this mode of transportation will remain viable in the private sector of the economy and will be able to provide energy-efficient, ecologically compatible transportation services with greater efficiency, effectiveness, and economy.²⁵

Prior to the 4R Act, rates had been set collectively in rate bureaus

21. See Darius W. Gaskins, Jr., *Regulation of Freight Railroads in the Modern Era*, 7 REV. NETWORK ECON. 561 (2008).

22. George W. Hilton, *The Consistency of the Interstate Commerce Act*, 9 J.L. & ECON. 87, 113 (1966).

23. Regional Rail Reorganization Act of 1973, 45 U.S.C. §§ 741-97 (2014).

24. *Id.* § 701(b)(2).

25. 45 U.S.C. § 801(a).

over a number of routes and divisions were based on particular formulae.²⁶ General rate increases by groups of carriers for large bodies of rates were considered in Investigation and Suspension dockets by the ICC in prolonged cases and proceedings. Relatively few individual rate cases were considered at the time, as the ICC worried about discrimination vis-à-vis other shippers and routes. Rates were often justified on the basis of revenue necessary to cover the costs of the weakest carriers or the highest cost routes. In a break with decades of regulatory fiat that had previously guided the industry, the 4R Act began the deregulation process by permitting railroads in competitive markets to raise and lower rates without the ICC's express involvement.²⁷

In its recognition of the need for financially healthy railroads, the 4R Act is where the revenue adequacy concept makes its first legislative appearance. Section 205 of the 4R Act tasks the ICC with developing and promulgating standards for determining adequate revenue levels that cover total operating expenses (including capital depreciation and replacement) as well as provide a fair economic profit or rate of return on railroad capital. The 4R Act specifically states:

With respect to common carriers by railroad, the Commission shall . . . develop and promulgate . . . reasonable standards and procedures for the establishment of revenue levels adequate . . . to cover total operating expenses, including depreciation and obsolescence, plus a fair, reasonable, and economic profit or return (or both) on capital employed in the business.²⁸

The 4R Act further indicates that the (adequate) revenues should be sufficient to:

- (a) provide a flow of net income plus depreciation adequate to support prudent capital outlays, assure the repayment of a reasonable level of debt, permit the raising of needed equity capital, and cover the effects of inflation[;]
- and (b) insure retention and attraction of capital in amounts adequate to provide a sound transportation system in the United States.²⁹

The 4R Act also provided clear regulatory guidance in stating that "[t]he Commission shall make an adequate and continuing effort *to assist such carriers in attaining such revenue levels*."³⁰ This language is consis-

26. See RICHARD D. STONE, *THE INTERSTATE COMMERCE COMMISSION AND THE RAILROAD INDUSTRY: A HISTORY OF REGULATORY POLICY* 93 (1991).

27. Rates are not subject to regulation unless the STB finds the railroad market dominant, which entails a qualitative evaluation of competitive pressures (e.g., intramodal, intermodal, product and geographic competition). See Wesley W. Wilson, *Legislated Market Dominance in Railroad Markets*, 4 RES. IN TRANSP. ECO. 49, 52 (1996).

28. Railroad Revitalization and Regulatory Reform Act of 1976, Pub. L. No. 94-210, § 205, 90 Stat. 31, 41 (1976).

29. *Id.*

30. *Id.*; see also U.S. GOV'T ACCOUNTABILITY OFFICE, GAO/RCED-87-15BR, RAILROAD

tent with the general thrust of the Carter administration and Congress at that time to eliminate unnecessary regulation and better position governmental resources to complement and enhance the productivity and performance of the transportation sector. It is clear in this context that revenue adequacy was not meant to be an extra arrow in the regulator's quiver, but instead was fashioned to be a metric by which to judge the railroad industry's progress in achieving financial stability and a method by which to gauge how regulatory policies were enabling or hindering that effort.

In the years following the 4R Act, the concept of revenue adequacy—or rather, revenue inadequacy of rail carriers at that time—became a central theme in congressional discussion of railroad policy. Congress held a symposium in 1977 that examined whether further legislation beyond the 4R Act was necessary as current regulations continued to hamper the railroad industry's ability to adjust rates, merge, and abandon obsolete services—all of which were seen as predicates to creating industry financial viability.³¹ A symposium panelist described the ICC's implementation of the revenue adequacy portion of the 4R act as follows:

[I]t remains uncertain . . . whether it is as yet understood what it will take to achieve the desired revenue objectives. With much rail traffic having to move at less than fully adequate rates, rates on higher-rated traffic must contribute a return above the target rate of return if, overall, railroads are prospectively to be allowed to bring their earnings and profits somewhat more in line with the goals of the 4-R Act.³²

Issues with efficiency and reliability were also identified as major problems within the rail industry. Panelists noted that from 1970 through 1977, ten railroad firms went bankrupt.³³ In addition to the financial woes of rail carriers, shippers were suffering from less than adequate service. In the twelve years leading up to 1977, only about 55 to 72 percent of carloads were "on time" (i.e., arriving within one day before or one day after the scheduled delivery day) with late carloads arriving up to ten days late.³⁴

In the years following the 1977 symposium, the railroad industry's financial woes continued. Twenty two percent of the U.S. rail system was

REVENUES: ANALYSIS OF ALTERNATIVE METHODS TO MEASURE REVENUE ADEQUACY 8 (1986).

31. STAFF OF S. COMM. ON TRANSP. & COMMERCE, 95TH CONG., 1ST SESS., CONGRESSIONAL SYMPOSIUM, RAILROADS—1977 AND BEYOND: PROBLEMS AND PROMISES VI (Comm. Print 1977).

32. *Id.* at 16 (statement of Richard J. Barber, President, Richard J. Barber Assocs., Inc.).

33. *Id.* at 31 (statement of Hon. Alan A. Butchman, Deputy Secretary, U.S. Dep't of Transp.).

34. *Id.* at 5-6 (statement of William K. Smith, Acting Chairman, U.S. Railway Ass'n).

facing bankruptcy given continued meager returns on investment between 2 and 3 percent.³⁵ The ICC's assessment in 1978 (released December 1979) defined revenue adequacy as a rate-of-return on investment between 7.0 and 10.6 percent, yet by that standard only 13 of the 36 Class I railroads had reached those levels.³⁶

Economists proffered their concerns with the state of the railroad industry during this period, arguing that industry deregulation would result in a more efficient system for both railroads and shippers. For example, one analysis argued that railroad deregulation allowing for long-term contracts between shippers and railroads would increase industry efficiency on the whole and benefit both parties.³⁷ Another quantitative analysis of the effect of mergers on intermodal freight ("piggybacking") found that "[r]egulation of railroad industry structure has prevented the rationalization of the rail network" and concluded that "the ICC is responsible for the structure of the industry and its consequences, including the failure of an obvious innovation to reach its potential in a quarter century of operation."³⁸

Despite the passage of the 4R Act, there was widespread sentiment among industry participants, legislators, and economists that more profound changes were needed for rail industry revitalization.³⁹ It was in this context that the Staggers Act garnered broad bipartisan support in both legislative bodies,⁴⁰ passing in the House (337-20) and Senate (91-4), and becoming law in October 1980.⁴¹ The Staggers Act's stated purpose

35. *Staggers Rail Act Oversight: Hearing Before the Subcomm. on Transp., Tourism, & Hazardous Materials of the H. Comm. on Energy & Commerce*, 100th Cong. 6 (1987) (statement of Rep. Dan Schaefer, Member, H. Comm. on Energy & Commerce).

36. *Adequacy of Railroad Revenue (1978 Determination)*, 362 I.C.C. 199, 246, 256 (1979).

37. Douglas A. Houston, *A Note on Railroad-Shipper Transactions: Appropriation, Private Contracts, and Regulation*, 19 *TRANSP. J.* 60, 65-66 (1979).

38. Lucy Ferguson, *Regulation and Innovation: The Case of Piggybacking*, 5 *E. ECON. J.* 453, 461 (1979).

39. THEODORE E. KEELER, *RAILROADS, FREIGHT AND PUBLIC POLICY: STUDIES IN THE REGULATION OF ECONOMIC ACTIVITY* 97 (1983) (while nominally granting pricing flexibility, these rate-making freedoms were "largely emasculated" by the ICC, effectively retaining many regulatory constraints of the pre-4R Act).

40. See *S. 1946 (96th): Staggers Rail Act of 1980*, GOVTRACK.US, <https://www.govtrack.us/congress/bills/96/s1946#overview> (last visited Jan. 6, 2015). Both House and Senate bills had bipartisan co-sponsorship. The Senate version of the bill, S. 1946, was cosponsored by Senators Russell B. Long (D-LA) and Robert Packwood (R-OR). The House version of the bill, H.R. 7235, was cosponsored by Representatives James Broyhill (R-NC10), Gary Lee (R-NY33), Edward Madigan (R-IL21), Robert Matsui (D-CA3), Barbara Mikulski (D-MD3), and James Santini (D-NV0)).

41. *Bill Summary & Status, 96th Congress (1979-1980), S.1946, Major Congressional Actions*, LIBRARY OF CONGRESS THOMAS, <http://thomas.loc.gov/cgi-bin/bdquery/z?d096:SN01946:@@@R> (last visited Jan. 6, 2015); *Bill Summary & Status, 96th Congress (1979-1980), H.R. 7235*, LIBRARY OF CONGRESS THOMAS, <http://thomas.loc.gov/cgi-bin/bdquery/z?d096:HR07235> (last visited Jan. 6, 2015).

was to “provide for the restoration, maintenance, and improvement of the physical facilities and financial stability of the rail system of the United States.”⁴² The Staggers Act recognized that most rail service was subject to competition and that many government regulations affecting railroads had become unnecessary and inefficient.⁴³ Consequently, the Act comprehensively reformed the industry governance structure by removing antitrust immunity for collective ratemaking, substantially removing pricing regulation, and easing the path for abandoning unprofitable routes and for allowing mergers.

Under the Staggers Act, shipments with rates less than 180 percent of a rail carrier’s variable costs of providing the service are presumptively assumed reasonable and are precluded from regulatory challenge.⁴⁴ Shipments with rates greater than 180 percent of the variable costs and where a railroad has “market dominance” must have “reasonable” rates.^{45,46}

The overall goals of the Staggers Act were not altogether distinct from those of the 4R Act, but clearly reflected discussion since the 4R Act’s passage. Reflecting its concern with the poor industry financial health, the Staggers Act provided a clear signal that revenues should be adequate to “promote a safe and efficient rail transportation system.”⁴⁷ While leaving the concept of revenue adequacy unchanged from definitions established in the 4R Act, the Staggers Act pointed toward three applications of revenue adequacy on a forward-going basis. First, the Act directed the ICC to determine annually which rail carriers are earning adequate revenues.⁴⁸ This application was a departure from the 4R Act’s original handling of revenue adequacy determination, which required the ICC to develop, promulgate, and maintain revenue adequacy standards

42. Staggers Rail Act of 1980 § 3, Pub L. No. 96-448, 94 Stat. 1897 (codified as amended in scattered sections of 49 U.S.C.).

43. *Id.* § 2(3)-(4).

44. *Id.* § 202(d)(2).

45. The 180 percent threshold was originally set at 160 percent and increased in five percentage point increments until reaching the current threshold in 1984. Market dominance is defined as an absence of effective competition from other rail carriers or modes of transportation for the transportation to which a rate applies. 49 U.S.C. § 10707(a); *see also* Wilson, *supra* note 27. The regulatory agency (then the ICC, now the STB) is charged with making the determination of whether a set of challenged rates is reasonable based on the threshold. The threshold represents the point at which the regulatory agency can begin to consider whether rates are unreasonable. That is, rates determined to be below the 180 percent threshold are conclusive that the rail carrier does not have market dominance. Rates determined to be above the 180 percent threshold do not necessarily establish a presumption of either market dominance or unreasonableness (or reasonableness).

46. Staggers Rail Act § 202(d)(2).

47. *Id.* § 101(3).

48. *Id.* § 205(b)(4).

with no specific time frame for revisions.⁴⁹ Second, the Act directed the ICC to “recognize” revenue adequacy when considering the reasonableness of rates. Specifically, the Staggers Act states:

In determining whether a rate established by a rail carrier is reasonable for purposes of this section, the [Interstate Commerce] Commission shall recognize the policy of this title that rail carriers shall earn adequate revenues, as established by the Commission under section 10704(a)(2) of this title.⁵⁰

Third, the Act forbid carriers earning adequate revenues from applying various surcharges to shippers, including joint-rate shipments and low-weight (less than 3 million tons) shipments, and made rate changes within “zones of rail carrier rate flexibility” conditional on whether a carrier’s revenues were deemed adequate.⁵¹

The primary provisions of the Staggers Act were designed to substantially free railroads from rate regulation, to end antitrust immunity for collective rate-making, and to ease line abandonments and corporate reorganizations. These provisions have not surprisingly received considerable attention. More subtle, but arguably of at least equal importance, the revenue adequacy language first introduced in the 4R Act and elaborated on in the Staggers Act became an important pillar of the policy governance of the industry.

III. THE MEASUREMENT AND USES OF REVENUE ADEQUACY

A. MEASUREMENT

In the earliest determination of revenue adequacy in the wake of the 4R Act, the ICC sought to provide “a concrete interpretation of what is meant by the statutory concept of adequate revenue, and of what is not meant by that concept.”⁵² Several foundational findings emerged from that effort. First, the ICC made it clear that the objectives of the revenue adequacy provisions within the 4R Act were “to provide *guideposts* by which to evaluate progress in implementing the rate and service flexibility provisions of the Act.”⁵³ The largely informative—as opposed to regulatory—role for revenue adequacy was underscored by the Commission which stated that “we do not expect to rely on the traditional form of earnings regulation employed for public utilities, where the objective is to

49. 45 U.S.C. § 801(b)(6) (2014).

50. Staggers Rail Act § 201(b)(3).

51. *Id.* § 217(a)(1). The Interstate Commerce Termination Act of 1995 eliminated the third set of revenue adequacy applications. See H.R. Rep. No. 104-311 reprinted in 1995 U.S.C.C.A.N. 793, 809 (regarding Joint Route Cancellation and Surcharge); H.R. Conf. Rep. No. 104-422 reprinted in 1995 U.S.C.C.A.N. 850, 859 (regarding ZORF).

52. Adequacy of Railroad Revenue (1978 Determination), 362 I.C.C. 199 (1979).

53. *Id.* (emphasis added).

equate the overall earnings level to a fair rate of return.”⁵⁴ The ICC went on to note that its interpretation of the revenue adequacy concept would have “implications for policy toward maximum rates in individual markets, but does not itself specify limits directly applicable to individual rates.”⁵⁵ Once established as a guidepost rather than a regulatory function, it was indicated that the revenue adequacy measurements would be “the very means by which the Commission would assist carriers in attaining adequate revenue levels.”⁵⁶

Second, the Commission provided its first, and as it turns out enduring, specification of the revenue adequacy metric. The Commission turned to the financial threshold concept of the “cost of capital” as the benchmark against which railroads would be judged revenue “adequate” or revenue “inadequate.” In particular, if railroad i had a return on investment (ROI_i) above the industry (I) cost of capital (COC_I) it would be labeled as “revenue adequate” while if ROI_i fell below industry COC_I , railroad i would be labeled “revenue inadequate.”⁵⁷

Third, while revenue adequacy or revenue inadequacy was determined by the relationship between firm ROI_i and industry COC_I , the Commission emphasized that measurement is “designed to compute a *minimum* adequate revenue level only for class I railroads,”⁵⁸ and that its methodology is “not necessarily appropriate for determination of the maximum fair revenue issues involved in individual rate proceedings.”⁵⁹ Consistent with the pricing flexibility goals of the Staggers Act, the Commission also observed that the “[a]dded freedom for carriers to change rates and services should result in permitting the carriers in individual markets to undertake all potentially profitable investments (all those that could earn *at least* the current cost of capital).⁶⁰

This interpretation of the cost of capital as a *floor* for the ability of a firm to attract capital with which to invest is textbook economics. For instance, a standard valuation textbook indicates that “[t]he guiding principle of value creation is that companies create value by investing capital they raise from investors to generate future cash flows at rates of return *exceeding* the cost of capital (the rates investors require to be paid for the use of their capital).⁶¹ Similarly, a classic text on corporate finance indi-

54. *Id.*

55. *Id.*

56. *Id.*

57. See *id.* It is generally beyond the scope of this paper to discuss how ROI and COC are calculated (e.g., historical versus replacement cost, definitions of long-run, etc.).

58. *Id.* (emphasis in original).

59. *Id.*

60. *Id.* (emphasis added).

61. See TIM KOLLER ET AL., VALUATION: MEASURING AND MANAGING THE VALUE OF COMPANIES 4 (5th ed. 2010) (emphasis added).

cates that “[t]he cost of capital is the *minimum* risk-adjusted rate of return that a project must earn in order to be acceptable to shareholders.”⁶² Yet another finance textbook states:

When creditors and owners invest in a business, they incur opportunity costs equal to the returns they could have earned on alternative, similar-risk investments. Together these opportunity costs define the *minimum* rate of return the company must earn on existing assets to meet the expectations of its capital providers. This is the firm’s cost of capital.⁶³

In 1981, 1986, and 1988, the ICC reconsidered and made subsequent minor refinements to its measure of revenue adequacy.⁶⁴ The Commission returned in each instance to its basic proposition that the revenue adequacy threshold is best proxied by the current cost of capital.⁶⁵ But the Commission continued to underscore that the revenue adequacy measure constituted a floor for the prospect of industry re-capitalization and reinvigoration. For instance, the Commission observed that its standard “is widely agreed to be the *minimum necessary* to attract and maintain capital in the railroad, or any other industry.”⁶⁶ It also noted that “[t]he minimum rate of return that will allow railroads to obtain investment funds is the cost of capital” and that “a financially sound firm must earn at a minimum a rate of return at least equal to the cost of capital”⁶⁷

The current measure of revenue adequacy remains essentially unchanged today—a largely “mechanical” procedure for assessing on an annual basis whether a railroad achieves a rate of return on net investment (ROI_i) at least equal to the current railroad industry cost of capital (COC_I) which we detail below.⁶⁸

B. USES OF REVENUE ADEQUACY

Apart from the measurement of revenue adequacy and the “guide-post” function for which it was originally introduced, the STB has over

62. THOMAS E. COPELAND & J. FRED WESTON, FINANCIAL THEORY AND CORPORATE POLICY 438 (3d ed. 1988) (emphasis added).

63. ROBERT C. HIGGINS, ANALYSIS FOR FINANCIAL MANAGEMENT (10th ed. 2011) (emphasis added); see also RICHARD BREALEY ET AL., PRINCIPLES OF CORPORATE FINANCE 10 (11th ed. 2014); BURTON GORDON MALKIEL, THE DEBT-EQUITY COMBINATION OF THE FIRM AND THE COST OF CAPITAL: AN INTRODUCTORY ANALYSIS 304 (1971).

64. See Standards for Railroad Revenue Adequacy, 364 I.C.C. 803 (1981); Standards for Railroad Revenue Adequacy, 3 I.C.C.2d 261 (1986); Supplemental Reporting of Consolidated Information for Revenue Adequacy Purposes, 5 I.C.C.2d 65 (1988).

65. See, e.g., 364 I.C.C. 803.

66. *Id.* at 809 (emphasis added).

67. *Id.* at 810, 816.

68. Railroad Revenue Adequacy—2012 Determination, S.T.B. Ex Parte No. 552 (Sub-No. 17) (Sept. 30, 2013), available at [http://www.stb.dot.gov/decisions/readingroom.nsf/UNID/3DCE93AFF1A9016785257C07004D61B9/\\$file/43299.pdf](http://www.stb.dot.gov/decisions/readingroom.nsf/UNID/3DCE93AFF1A9016785257C07004D61B9/$file/43299.pdf).

time increasingly drawn upon the concept for regulatory purposes. The first major instance of this use appears in the development of Constrained Market Pricing in the STB's Coal Rate Guidelines, which identifies a "Revenue Adequacy Constraint."⁶⁹ The STB first notes in these guidelines that adequate revenues are "those which provide a rate of return on net investment equal to the current cost of capital."⁷⁰ This definition is consistent with the annual revenue adequacy calculations required by Section 205 of the Staggers Act. The STB then departs significantly from—and seemingly outright ignores—its earlier determination that revenue adequacy calculations represent a guidepost rather than a regulatory tool, however, when it states "[o]ur revenue adequacy standard represents a reasonable level of profitability for a healthy carrier Carriers do not need any greater revenues than this standard permits, and we believe that, in a regulated setting, they are not entitled to any higher revenues."^{71,72}

The practical importance of the Revenue Adequacy Constraint has been subsequently tempered by two considerations. First, at the time of the Revenue Adequacy Constraint's formation all railroads were essentially revenue inadequate,⁷³ rendering the constraint nonbinding. Second, in the STB's Coal Rate Guidelines, an alternative "Stand-Alone Cost" test for the reasonableness of specific rail shipments subject to regulatory oversight was subsequently adopted and implemented.⁷⁴ This test draws from modern microeconomic theory and is designed to ensure that rates for specific shipments are not so high as to generate cross-subsidies.⁷⁵ In particular, rates for a multiproduct firm's offerings that lie above the marginal cost of that offering and below the stand-alone cost of that offering are deemed subsidy free and therefore "reasonable," while rates outside of these bounds embody subsidy flows and are deemed "unreasonable." In summary, while the immediate impact of the Revenue Adequacy Constraint was muted, it is nonetheless clear that its introduction signaled a philosophical shift by the STB regarding the revenue adequacy concept.

69. Coal Rate Guidelines, Nationwide, 1 I.C.C.2d 520, 534-45 (1985).

70. *Id.* at 535.

71. *Id.*

72. Statements such as these have led industry observers to believe that the STB may intervene if the railroad company is earning a rate of return greater than its cost of capital. See Russell Pittman, The Economics of Railroad "Captive Shipper" Legislation, 62 ADMIN. L. REV. 919 (2010).

73. See U.S. GOV'T ACCOUNTABILITY OFFICE, GAO/RCED-87-15BR, RAILROAD REVENUES: ANALYSIS OF ALTERNATIVE METHODS TO MEASURE REVENUE ADEQUACY 8, 26 (1986).

74. See Coal Rate Guidelines, Nationwide, 1 I.C.C.2d 520, 524 (1985).

75. See Gerald R. Faulhaber, Cross-Subsidization: Pricing in Public Enterprises, 65 AM. ECON. REV. 966, 966 (1975).

The STB has more recently made additional connections between its calculation of revenue adequacy and regulated prices. In particular, an "RSAM Benchmark" was introduced in 1996 for determining the reasonableness of rates.⁷⁶ While not directly linking revenue adequacy determinations to price regulation, the RSAM Benchmark does so indirectly. RSAM is a measure of "the uniform markup above variable cost that would be needed from every shipper of potentially captive traffic (the >180 revenue-to-variable-cost traffic group) in order for the carrier to recover all of its . . . fixed costs."⁷⁷ RSAM, as currently constructed, uses the following variables:

<i>REV</i>_{>180}	Total revenue from all traffic provided by a rail carrier which has a revenue-to-variable-cost ratio greater than 180.
<i>VC</i>_{>180}	Variable costs of all traffic provided by a rail carrier which has a revenue-to-variable-cost ratio greater than 180.
<i>REV</i>_{shortage/overage}	Total dollars by which a rail carrier either falls short of or exceeds revenue adequacy as determined by a four-year average of the annual revenue adequacy calculations.

A shortage represents the amount of additional revenue a revenue inadequate carrier would need to be revenue adequate, and is added to the revenue actually received. An overage represents the amount of revenue a revenue adequate carrier receives in excess of the amount to be revenue adequate, and is subtracted from the revenue actually received.

RSAM is calculated as:

$$RSAM = \frac{REV_{>180} + REV_{shortage/overage}}{VC_{>180}}$$

It is evident that with this RSAM formula, firm profitability (as proxied by revenue adequacy calculations) can trigger findings in which rates for a specific shipment or set of shipments are deemed unreasonable.

RSAM is calculated each year. The STB then averages RSAM values over the four most recent years to derive an RSAM factor that it uses in various price tests of profit regulation. One such test is the regulatory introduction of the so-called "limit price" approach.⁷⁸ First, the STB identifies a "limit price" which represents the highest price a railroad

76. See Rate Guidelines—Non-Coal Proceedings, S.T.B. Ex Parte No. 347 (Sub-No. 2), 1 S.T.B. 1004, 1027 (Dec. 27, 1996).

77. *Id.*

78. *M&G Polymers USA, LLC v. CSX Transportation, Inc.*, S.T.B. No. NOR 42123, at 3-4 (decided Sept. 26, 2012, updated Dec. 7, 2012), available at [http://www.stb.dot.gov/decisions/readingroom.nsf/UNID/64E3F8C385BA40A585257A8600483883/\\$file/41926.pdf](http://www.stb.dot.gov/decisions/readingroom.nsf/UNID/64E3F8C385BA40A585257A8600483883/$file/41926.pdf).

could charge for a shipment in question “without causing a significant amount of the issue traffic on a particular rail movement to be diverted to a competitive alternative.”⁷⁹ As a practical matter, this limit price is proxied by the “price of the transportation alternative” to the shipment in question.⁸⁰ Second, the STB compares this limit price to the railroad carrier’s variable cost of the identified shipment, referring to the ratio of the limit price over variable costs as the “Limit Price R/VC Ratio.”⁸¹ Third, the STB compares the Limit Price R/VC Ratio to RSAM. In situations where the Limit Price R/VC Ratio exceeds RSAM, the STB infers that the alternative does not exert competitive pressure sufficient to constrain prices.⁸² Because RSAM is determined based on the STB’s calculation of revenue adequacy, imposition of Limit Price to R/VC Ratio-based prices links regulated rates on specific rail shipments to the observed profitability of the railroad carrier.

IV. WHAT REVENUE ADEQUACY MEASUREMENT IS AND IS NOT

While the years following the regulatory reforms adopted in the 4R Act and the Staggers Act provoked discussion of the appropriate measurement of revenue adequacy,⁸³ its measurement has remained essentially unchanged. This measure compares as a ratio each railroad *i*’s return on investment (ROI_i) with the industry cost of capital (COC_I), and thus ranges from negative for firms with negative ROIs to positive for firms with positive ROIs. The ICC (and subsequently the STB) adopted the convention of declaring a firm “revenue adequate” if $ROI_i/COC_I > 1$ and “revenue inadequate” if $ROI_i/COC_I < 1$.⁸⁴ The policy attraction to this threshold around a value of unity is natural, given that standard financial theory indicates firms with ROIs less than the cost of capital are financially constrained and intuitively “inadequate.”⁸⁵ It is less obvious how to interpret firms’ financial standing when $ROI_i/COC_I > 1$. Two explanations prevail either implicitly or explicitly. First, among the financial community, it is uncontroversial that higher ROI_i/COC_I ratios connote “better” economic performance. This is manifest either by cross-sectional comparisons or inter-temporal comparisons. Figure 1 provides

79. *Id.* at 13.

80. *Id.* at 13-14.

81. *Id.* at 14.

82. *Id.*

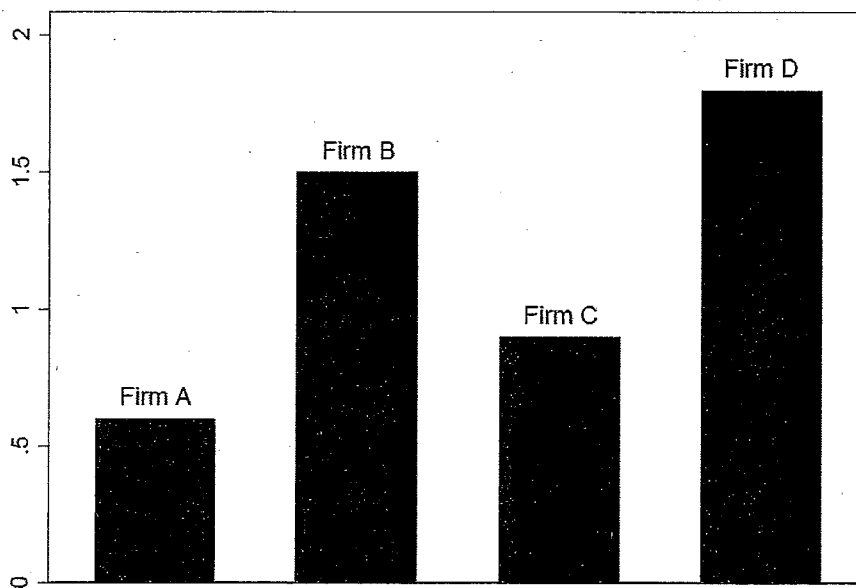
83. See, e.g., U.S. GOV’T ACCOUNTABILITY OFFICE, GAO/RCED-87-15BR, RAILROAD REVENUES: ANALYSIS OF ALTERNATIVE METHODS TO MEASURE REVENUE ADEQUACY 8, 28-30 (1986).

84. *Id.* at 8.

85. See *supra* Part III(A).

an example whereby a hypothetical set of firms within a hypothetical industry produce a range of ROI_i/COC_i ratios.

$\frac{ROI_i}{COC_i}$
FIGURE 1 – $\frac{ROI_i}{COC_i}$ INTRA-INDUSTRY COMPARISONS



Regardless of a particular regulatory benchmark for “revenue adequacy,” a standard financial interpretation of the firms in Figure 1 would indicate that firm D is financially healthier than firms A through C, *ceteris paribus*. Figure 2 similarly provides ROI_i/COC_i ratios for a hypothetical firm over time, and again the standard financial interpretation would be that the financial health of the observed firm is improving over time. Whether viewed cross-sectionally or inter-temporally, standard financial interpretations of ROI_i/COC_i thus provide a simple metric of the health of the observed firm or firms.

In many industries, there is little if any policy relevance of observed ROI_i/COC_i values. In the railroad industry, however, the Staggers Act declares that it is the policy of the United States “to promote a safe and efficient rail transportation system by allowing rail carriers to earn adequate revenues, as determined by the Interstate Commerce Commission.”⁸⁶ Congress in doing so has compelled regulators to consider the industry’s financial health as proxied by revenue adequacy. Interpreted from a financial perspective then, higher ROI_i/COC_i levels can be seen as

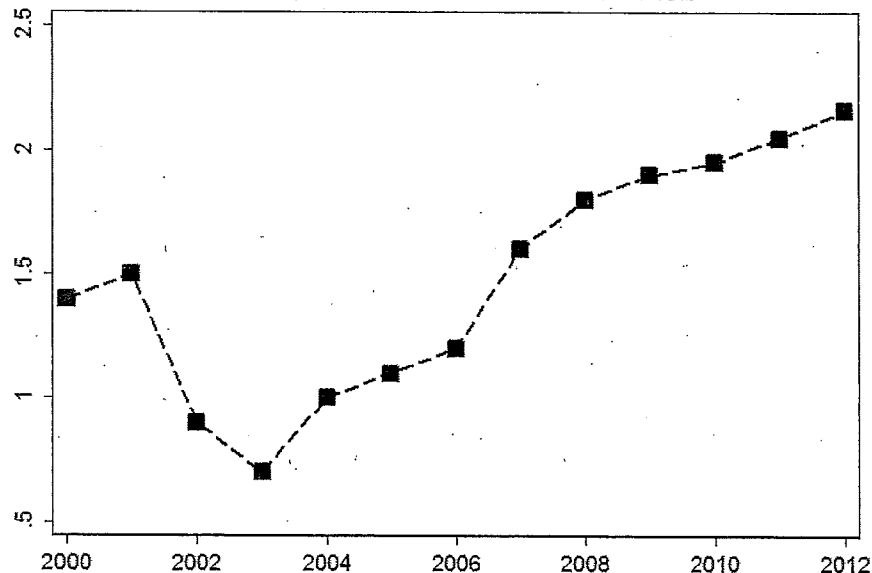
86. Staggers Rail Act of 1980 § 101, Pub L. No. 96-448, 94 Stat. 1897 (codified as amended at 49 U.S.C. 10101(a)(3) (2014)).

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$\frac{ROI_t}{COC_t}$
FIGURE 2 – $\frac{ROI_t}{COC_t}$ TEMPORAL COMPARISONS



indicators of regulators' success in advancing the Staggers Act's goals by fostering a policy environment in which railroad firms are increasingly financially healthy.

A second interpretation of $ROI/COC_t > 1$ (i.e., the firm is revenue adequate) arises implicitly or explicitly. In particular, some interpret $ROI/COC_t > 1$ as an indication of excess economic or monopoly returns.⁸⁷ This interpretation, in turn, may compel calls for regulatory measures to restrict pricing flexibility of the firm in question. But while it is theoretically *possible* that observations of $ROI/COC_t > 1$ are indications of monopoly returns, there are several reasons why such an inference is in almost all instances incorrect.

These reasons begin with the observation that accounting returns—such as those indicated by the revenue adequacy measure—are different than economic returns. Economic returns are given by the discount rate that equates the present value of an expected cash flow stream to the initial investment outlay.⁸⁸ In this regard, “[i]t is an economic rate of return (after risk adjustment) above the cost of capital that promotes expansion under competition and is produced by output restriction under

87. The appeal of this interpretation stems from the long-run equilibrium tendency for firms in perfectly competitive markets to earn returns that are equal to the risk-adjusted opportunity cost of capital.

88. Franklin Fisher & John J. McGowan, *On the Misuse of Accounting Rates of Return to Infer Monopoly Profit*, 73 AM. ECON. REV. 82, 82 (1983).

monopoly.”⁸⁹ In contrast, accounting returns such as ROI/COC_t are simply a measure of historical net income relative to an accounting-depreciated asset base.

While conceptually different, even if accounting and economic returns were congruent in practice, economic returns in excess of the cost of capital may be generated by *either* “expansion under competition” or “output restrictions under monopoly.” It is therefore not possible to infer the presence of excess or monopoly economic returns by observing higher levels of accounting returns. That is, higher accounting returns may be produced either from a variety of profit-enhancing pro-competitive behavior—such as productivity enhancements, cost reductions, innovative management and operating practices—or from monopolistic pricing.

The conceptual gulf between accounting profits and excessive or monopoly economic profits is further widened for a variety of practical reasons ranging from inflation effects; accounting and economic depreciation differences; alternative risk, cyclicity and (firm and industry) profitability measures; secular trends and industry disequilibria.⁹⁰ One examination of the misuse of accounting returns to infer the existence of monopoly profits demonstrates that even under conditions favorable to the potential for accounting returns to convey information on economic returns, it is altogether possible that accounting returns may be *negatively* related to economic returns.⁹¹ Given the myriad ways in which accounting returns and economic returns differ, economists tend to eschew inferences of monopolistic exploitation from the use of accounting returns.

Beyond the general inability for accounting returns to connote the presence of monopoly returns or monopolistic exploitation, there are several reasons why this admonition holds in relief for the rail industry. First, while excessive or monopolistic returns are a long-run phenomenon—at least from the perspective of public policy⁹²—the measurement of revenue adequacy is a calculation of firm performance within a calendar year. Second, the STB measure of revenue adequacy compares a given firm’s return on investment (ROI_i) to the industry cost of capital

89. *Id.*

90. See Richard Schmalensee, *Do Markets Differ Much?*, 75 AM. ECON. REV. 341, 343 (1985); see generally GEOFFREY WHITTINGTON, *INFLATION ACCOUNTING: AN INTRODUCTION TO THE DEBATE* (1983); Thomas R. Stauffer, *The Measurement of Corporate Rates of Return: A Generalized Formulation*, 2 BELL J. ECON. & MGMT. SCI. 434 (1971); Richard Schmalensee, *Risk and Return on Long Lived Tangible Assets*, 9 J. FIN. ECON. 185 (1981); Ralph M. Bradburd & Richard E. Caves, *A Closer Look at the Effect of Market Growth on Industries’ Profits*, 64 REV. ECON. & STAT. 635 (1982).

91. See Fisher & McGowan, *supra* note 88, at 83.

92. The natural vicissitudes of market demand will cause accounting earnings to vary from year to year and are therefore typically of essentially no public policy import.

(COC_i). A firm could appear to be “revenue adequate” if its return on investment (ROI_i) exceeds the industry cost of capital (COC_i) although its cost of capital (COC_i) exceeds its (ROI_i). Conversely, a firm could appear to be revenue inadequate because its ROI_i/COC_i is less than unity, even though it may have a sufficiently low firm-specific cost of capital (COC_i) that exceeds its firm-specific return on investment (ROI_i).

Third, and arguably most profound, U.S. railroads typically provide a multitude of transportation services. These services vary by location (e.g., shipments from Kansas City to New Orleans are different from shipments from San Diego to Denver) and by shipment type (e.g., shipments of petro-chemicals differ from shipments of corn). It is widely acknowledged that since the Staggers Act, “most transportation within the United States [has become] competitive.”⁹³ Rail services in this context are principally, though not in every instance, provided subject to effective competition. A firm’s return in excess of its cost of capital is therefore as (or even more) likely to arise from competitive locations and commodities than non-competitive locations and commodities. For example, to the extent that a railroad improves the value of its product offering for a competitive shipment, it may experience enhanced sales, increased accounting profitability, and corresponding increases in its revenue adequacy measurement. Similarly, to the extent that a railroad is able to reduce the costs of providing its competitive services, its profitability as reflected in the STB’s measurement of its revenue adequacy will increase. And while demand enhancements or cost reductions from a railroad’s competitive shipments will drive revenue adequacy in ways that have nothing to do with exploitation of market power, this same conclusion also holds true for railroad offerings in non-competitive shipments. Profit-maximizing firms are naturally driven to create value from their entire product portfolio and have incentives to reduce cost and enhance demand in competitive and non-competitive offerings. Even for non-competitive shipments, competitive behaviors such as enhancing product quality or reducing cost elevate firm profitability and the consequent revenue adequacy measure reported by the STB.

Finally, railroads may affect profitability either through product-specific or firm-wide activities. Efforts to reduce fixed costs, to improve management or labor practices, or to provide company-wide innovative service offerings are all reflected in increases in the STB’s revenue adequacy measures, yet these improvements are not reflective of excessive returns or monopolistic exploitation.

In short, while increases in ROI_i/COC_i may arise from market power exploitation, it is clear that there are a host of alternative pro-competitive

93. Staggers Rail Act of 1980 § 2, Pub L. No. 96-448, 94 Stat. 1896.

sources that give rise to revenue adequacy increases. As we argue below, the fact that there are multiple sources for changes in ROI/COC_t suggests that policies that condition or provoke regulatory intervention on the realization of revenue adequacy creates the substantial risk of punishing pro-competitive behaviors, rather than specifically testing for and targeting regulatory intervention indicative of market power exploitation. In summary, financial profitability measures—such as those reported by the STB's revenue adequacy measure—are particularly poor indicators of excessive returns that result from monopoly power. Increased financial profitability can and does routinely occur for firms as a result of cost savings, productivity gains, and value-enhancing services.

V. REVENUE ADEQUACY IN AN EMPIRICAL PERSPECTIVE

Despite the general inability to interpret increased profitability as an indication of excessive or monopolistic returns, it is nonetheless instructive to benchmark rail industry returns with those from other comparable industries. To do so, we draw upon data from COMPUSTAT, a comprehensive financial information repository of virtually all publicly-traded firms operating in the United States. For all non-financial firms in COMPUSTAT, we construct an estimate of each firm's ROI in a manner that comports as closely as possible to the methodology used by the STB in its revenue adequacy calculations.⁹⁴ Our total sample consists of 1,720 firms operating continuously for the 2000-2012 period.⁹⁵

As ROIs typically vary within industries and over time so too does the cost of capital, which determines the denominator in STB calculations of revenue adequacy. By combining modern cost of capital estimates with observed ROIs, we are able to further benchmark revenue adequacy of the rail industry over time and against other industries.⁹⁶

94. To do so, we begin with Schedule 250 "Consolidated Information for Revenue Adequacy Determination," which is filed by all Class I railroads as part of their annual R-1 filing. The computation of ROI (the numerator in revenue adequacy) is determined by dividing Adjusted Net Railway Operating Income (line 5 of Schedule 250) by the average Net Investment Base (line 13 on Schedule 250, average of beginning and ending year). We compare the information in Schedule 250 and the rest of the R-1 to the financial information provided in the annual 10-K which public companies must file with the Securities and Exchange Commission (SEC). Using the information in the 10-K, we attempt to recreate the computation of ROI. The Appendix to this paper provides a detailed description of the process we employ.

95. Because we are examining the five Class I railroads which survived to the present, we compare them to other firms which were in existence over our entire sample period of 2000-2012. Our results are similar if we do not impose this survival restriction, although the distribution has many more firms with negative ROI. In the unbalanced panel, the annual number of firms varies between 2,137 and 3,296.

96. For industry cost of capital (COC_t), we use the data provided by Professor Aswath Damodaran on his website. The main site is <http://pages.stern.nyu.edu/~adamodar/>. The current year industry cost of capital can be downloaded at <http://www.stern.nyu.edu/~adamodar/pc/>

As an initial comparison, we first examine ROI/COC_t for the set of Class I railroads over 2001-2012 with a comparison set of industries used by the U.S. Government Accountability Office (GAO) in a benchmarking exercise conducted in 1986.^{97,98} The GAO identified firms in the following “comparable” industries: trucking, electric utilities, natural gas pipelines, steel, industrial chemicals and synthetics, and oil and gas.⁹⁹ We selected three-digit North American Industry Classification System (NAICS) industries with the same title used by GAO to identify firms in these industries.¹⁰⁰ This approach resulted in industry comparison groups of between ten firms (steel and natural gas pipelines) and 54 firms (oil and gas).

Figure 3 displays the annual median ROI/COC_t in the rail industry and the comparable industries over 2001-2012. Two findings readily

datasets/wacc.xls, while the historical measures can be found in his data archive. As cost of capital needs to be estimated, there are a plethora of assumptions involved in that estimation. The benefit of using the Damodaran data is that we can remain agnostic as to what assumptions to make across industries and remain as objective as possible. Using a single source for the entire time-series furthermore means that the assumptions are likely to remain consistent across time. While our *relative* revenue adequacies across firms are unaffected by any difference between the cost of capital estimated by Damodaran and that estimated by the STB, we are careful not to make too much of the levels. We compared the cost of capital estimates for railroads from Damodaran to those used by the STB. For the 2000-2012 period, the STB estimates were always higher than the Damodaran estimates, ranging from a low of 170 basis points to a high of 535 basis points. The mean difference is 321 basis points with a standard deviation of 100 basis points. To the extent that the STB would estimate a higher cost of capital than what we use, this would bias us toward finding higher levels of revenue adequacy than the STB would calculate. As such, our results would overstate the revenue adequacy of the railroad industry.

97. The set of Class I railroads we examine are: BNSF Railway, CSX Transportation, Kansas City Southern, Norfolk Southern, and Union Pacific. We exclude two Class I railroads for lack of publicly available data. Grand Trunk Corporation is a subsidiary of Canadian National and Soo Line Corporation is a subsidiary of Canadian Pacific. We only have data on the consolidated corporation, which is primarily the Canadian operations; thus, we cannot examine the U.S. data separately.

98. U.S. Gov't Accountability Office, GAO/RCED-87-15BR, *Railroad Revenues: Analysis of Alternative Methods to Measure Revenue Adequacy* 8 (1986). This study tested alternative revenue adequacy standards at the request of the House of Representatives' Subcommittee on Oversight and Investigations within the Committee on Energy and Commerce. The main finding is financial indicators indicate a “mixed picture” of railroads' financial health, with returns below the ICC-determined standard necessary to attract adequate capital but debt servicing levels showing improved financial health.

99. *Id.* at 134-35.

100. Railroads are defined as NAICS code 482. Trucking is 484, Utilities is 221, and Oil and Gas is 211. For two industries, we used four-digit NAICS codes because the three-digit code was too broad. Steel is defined as 3311 or 3315 in order to examine only producers of steel rather than companies that manufacture products from purchased steel or companies that specialize in other metals. Chemicals is defined as 3251 so that we only have basic industrial chemicals and not pharmaceuticals or biotech companies, which are better classified as drug manufacturing. As a robustness check, we also used the three-digit categorization for all the comparable industries, with very similar conclusions to those we report here.

emerge. First, while generally improving over 2001-2012, rail industry revenue adequacy ratios are otherwise indistinguishable relative to the comparison set. In particular, the rail industry median ROI/COC_i falls in the middle of other comparable industries' median ROI/COC_i over 2001-2012. Second, while the rail industry median ROI/COC_i has varied within the set of comparable industries, movements up or down among industries is entirely normal. For example, the natural gas pipeline industry had the highest revenue adequacy ratios over 2001-2003, the trucking industry in 2004, the steel industry over 2005-2007, and natural gas pipelines industry again over 2008-2012.

$\frac{ROI_i}{COC_i}$
FIGURE 3 – MEDIAN $\frac{ROI_i}{COC_i}$ OF SELECT INDUSTRIES
(WITH RRs INDICATED).

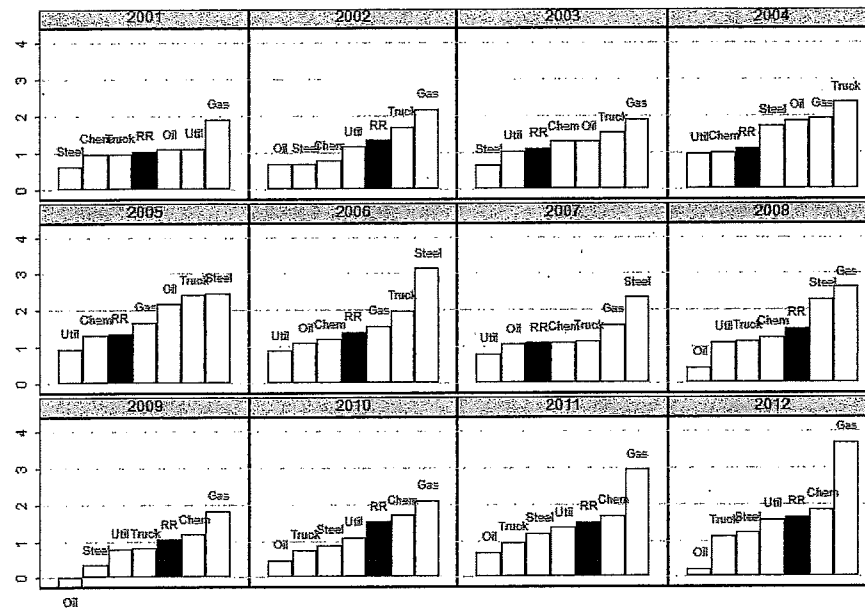
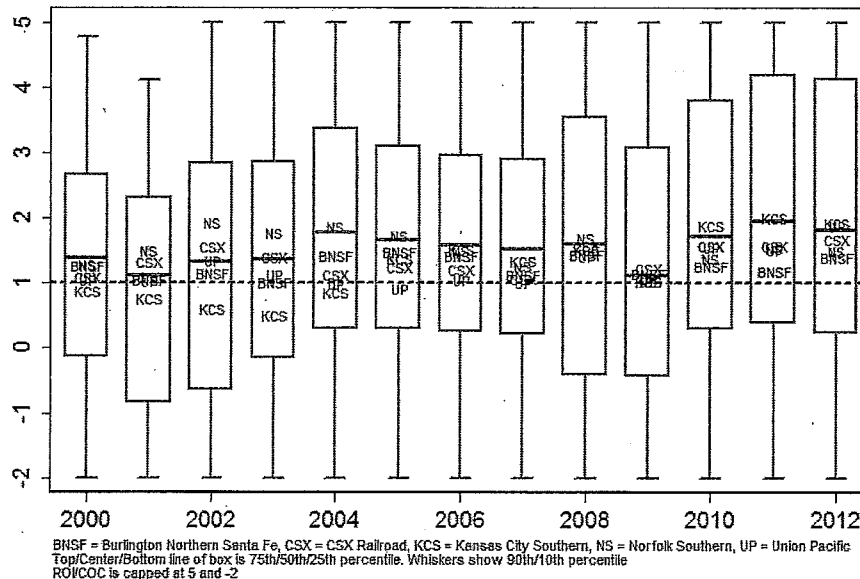


Figure 4 displays the annual distribution of ROI/COC_i ratios for 1,720 industrial firms over 2001-2012. The top and bottom of each box-year represent the 75th and 25th percentiles of revenue adequacy, respectively, while the line in the middle of each box-year indicates the median. The whiskers extending from the top and bottom of the bars show the range from the 90th percentile to the 10th percentile, respectively. This figure additionally shows revenue adequacy ratios for the five Class I rail-

roads.¹⁰¹ Several observations readily emerge. First, firms realize ROI/COC_t measures that range from “inadequate” to “adequate” every year. ROI/COC_t equal to unity lies well within the 25th-75th percentile range of observed revenue adequacy realizations every year, with values both above and below the revenue adequacy threshold. Revenue adequate and revenue inadequate firms are thus an empirical regularity, and this mix appears economically normal. Second, across the set of all firm-year observations, median-value revenue adequacy measures are greater than unity. That is, median firms across industries routinely and typically realize “revenue adequacy,” and in some years median-value observed ROI/COC_t ’s approach two. Third, while there is an expected dispersion among realized revenue adequacy values across Class I railroads, these values fall well within the 25th-75th percentile range every year against the comparison set of U.S. publicly-traded nonfinancial firms and are in no sense outliers. Finally, among this large class of publicly-traded nonfinancial firms, railroad firms’ adequacy is typically close to the median values. While revenue adequacy measures have improved for railroads in recent years, the relative position of railroads among the larger class of U.S. firms has remained relatively constant. In summary, if the revenue adequacy of the rail industry is put into the larger perspective of revenue adequacy relative to the broader set of firms operating in the U.S. economy over the past dozen years, there is little to distinguish its performance. In the historical context of the industry’s poor performance prior to deregulation, this analysis is encouraging and suggestive that railroads is operating as a “more normal” industry today. At the same time, the analysis provides no support for the proposition that rail industry’s revenue adequacy realizations are unusual or excessive.

101. BNSF = BNSF Railway; CSX = CSX Corp; KCS = Kansas City Southern; NS = Norfolk Southern Corp; and UP = Union Pacific Corp.

$\frac{ROI_t}{COC_t}$
FIGURE 4 – DISTRIBUTION OF $\frac{COC_t}{ROI_t}$ FOR U.S. NONFINANCIAL FIRMS



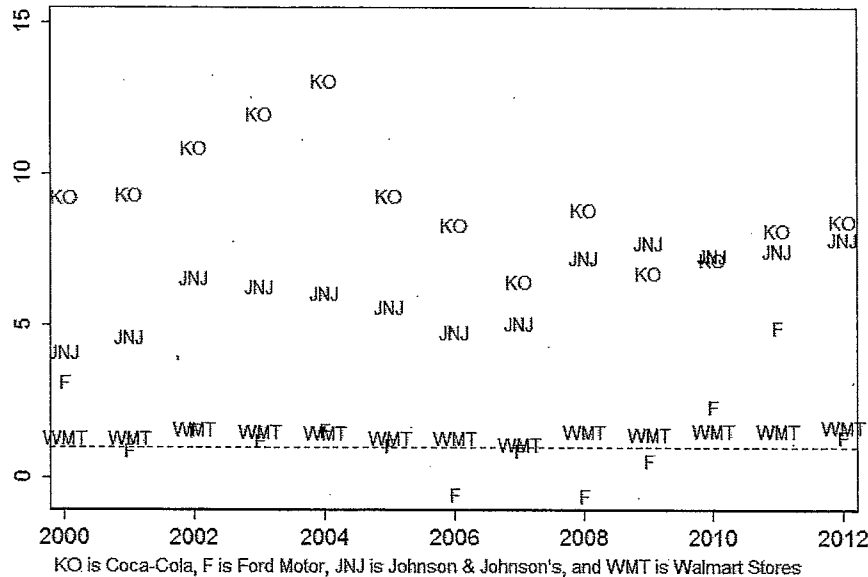
To provide further perspective, we generate revenue adequacy measures for specific well-known firms operating in four different and highly competitive markets: Coca-Cola (soft drinks), Ford (automobiles), Johnson & Johnson (J&J) (consumer package goods) and Walmart (retailing). These firms are among the largest and most well recognized firms in the U.S. Figure 5 shows the ROI/COC_t ratio for each firm over 2000-2012. Coca-Cola and J&J have ratios that are significantly above unity (nearly five) in each year of the sample. Relative to individual railroads, these ROI/COC_t values are extremely high, but notably are of no immediate public policy concern. Walmart, the largest company in the United States and a firm noted for bringing value to customers has also been revenue adequate every year, with its ratio ranging between 1.07 and 1.66. Ford Motor, similar to the railroads, has exhibited greater variation over the years, with “inadequate” revenues in some years and adequate revenues in other years. Figure 5 thus indicates not only that variation in revenue adequacy metrics across companies and over time is normal, but also that firms operating in highly competitive segments of the economy can realize revenue adequacy metrics above and below unity. In summary, whether assessed relative to firms in other comparable industries, the broad array of non-financial firms operating in the U.S. or leading firms operating in competitive markets, revenue adequacy measures of U.S. rail carriers are in every sense “normal.”

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$\frac{ROI_i}{COC_i}$
FIGURE 5 – $\frac{ROI_i}{COC_i}$ FOR SELECTED LARGE U.S. FIRMS



VI. ADEQUATE REVENUES – A NONFINANCIAL EXAMINATION

The term “revenue adequate” has consistently been operationalized as a financial metric, yet the phrase itself provokes the natural question, “adequate for what?” In this regard, the Staggers Act indicates that revenues should be adequate “to promote a safe and efficient rail transportation system.”¹⁰² Against this backdrop it is useful to ask whether the governance structure introduced by the Staggers Act, and the ensuing revenues that have been and are flowing to railroads, are adequate to afford the development of a “safe and efficient” rail system. Economic signals of an efficient rail transportation system would include increased output, increased service breadth and utility (manifested by increased modal market share for rail), reduced costs, and consumer value indications (e.g., favorable raw prices, prices after accounting for cost changes, and quality of service). As with all transportation modes, safety is principally gauged by the frequency and severity of casualties.

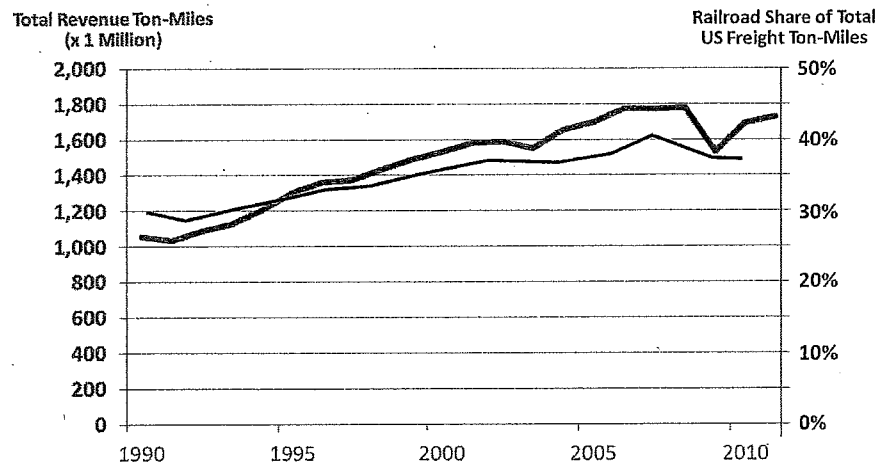
While detailed analysis of these metrics is beyond the scope of this paper, aggregate economic efficiency metrics are indeed encouraging. Economic studies in the wake of the Staggers Act consistently find substantial economic efficiency gains resulting from its passage. For exam-

102. Staggers Rail Act of 1980 § 101, Pub L. No. 96-448, 94 Stat. 1897 (codified as amended at 49 U.S.C. 10101(a)(3) (2014)).

ple, one early econometric study estimated that the changes adopted by Staggers "generated approximately \$15 billion worth of annual efficiency gains."¹⁰³ It is clear that the governance structure introduced in the Staggers Act has enabled a state of financial health (as proxied by revenue adequacy measures) that is promoting a safer and more efficient rail transportation system.

More recent metrics also support the conclusion that the governance structure in place has enabled economic efficiencies. Figure 6 indicates that total rail freight services output in the United States has grown substantially since 1990. And this growth appears both in the absolute output as measured by revenue ton-miles and railroads' relative ton-mile share of commercial freight activity.

FIGURE 6 – RAIL REVENUE TON-MILES AND TON-MILE SHARE



Source: U.S. Dept. of Transp., Bureau of Trans. Stat.

Output growth is partially due to expanding railroad service options. Figure 7 indicates rail shipments involving containers and trailers (i.e., intermodal traffic) have grown dramatically over the 1988-2012 period.¹⁰⁴

103. CC. Barnekov & A.N. Kleit, *The Efficiency Effects of Railroad Deregulation in the United States*, 17 INT'L J. TRANSP. ECON. 21, 21 (1990).

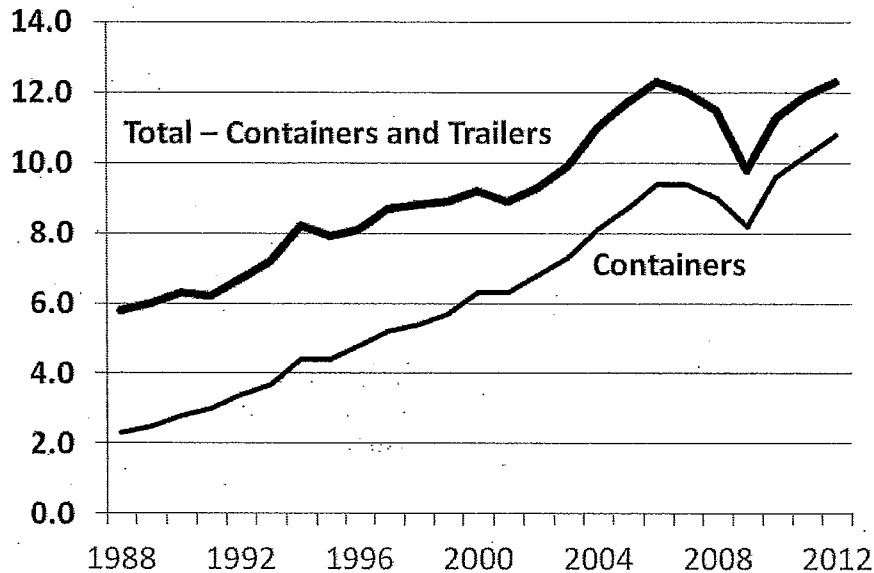
104. See e.g., Russell Pittman, *The Economics of Railroad "Captive Shipper" Legislation*, 62 ADMIN. L. REV. 223, 224 (2010).

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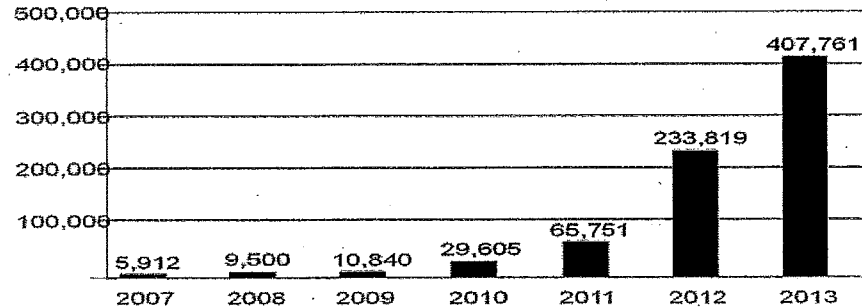
FIGURE 7 – INTERMODAL TRAFFIC GROWTH

Unit Volume
(X 1 Million)

Source: Association of American Railroads, Railroad Facts, 2001 and 2013 Editions (p. 26)

Figure 8 indicates railroads have played an increasing role in transporting North America's rapidly expanding crude oil production, especially in the most recent years. This ability to accommodate expanding sectors of economic activity is yet another indicator that the governance structure established by the Staggers Act and the ensuing rail revenues are consistent with the emergence of an efficient rail transportation system.

FIGURE 8 – CRUDE BY RAIL (CBR) TRAFFIC GROWTH

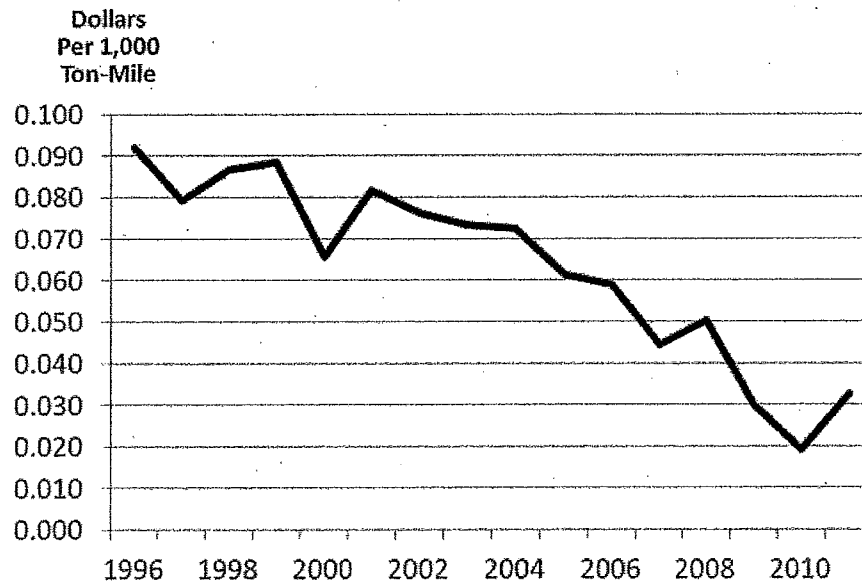


2013 estimate based on first three quarters annualized.

Source: STB Freight Commodity Statistics Reports (see <http://www.stb.dot.gov/econdata.nsf/FCStatistics?OpenView&Start=1&Count=300&Expand=1.1#1.1>)

Figure 9 indicates that the quality of railroad service—as measured by the likelihood of freight loss or damage—continues to improve even as traffic quantities increase. As indicated in Figure 9, real freight loss and damage expenses in 2010 were less than one-third of what they were in 1995.

FIGURE 9 – REAL FREIGHT LOSS & DAMAGE EXPENSE

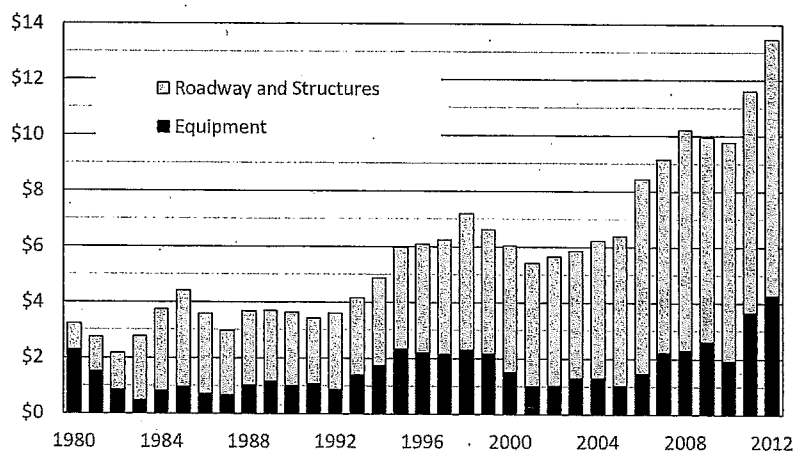


Source: STB Annual Report Form R-1 Schedule 410s of Individual Railroads (see <http://www.stb.dot.gov/econdata.nsf/f039526076cc0f8e8525660b006870c9?OpenView&Start=1&Count=300&Collapse=1#1>)

The railroad industry has also made substantial investments in modernizing its equipment and rail networks since the Staggers Act.¹⁰⁵ Many of these investments have come at public behest or are direct responses to emerging economic opportunities that have implications beyond freight transportation. Figure 10 depicts post-Staggers capital expenditures for railroad equipment and infrastructure. By 2012, industry capital expenditures by Class I railroads were among the largest across all firms operating in the United States.^{106,107}

FIGURE 10 – CAPITAL SPENDING, TRACK AND EQUIPMENT

Nominal Dollars
(X 1 Billion)



Source: STB Annual Report Form R-1 Schedule 410 of Individual Railroads (see <http://www.stb.dot.gov/econddata.nsf/f039526076cc0f8e8525660b006870c9?OpenView&Start=1&Count=300&Collapse=1#1>)

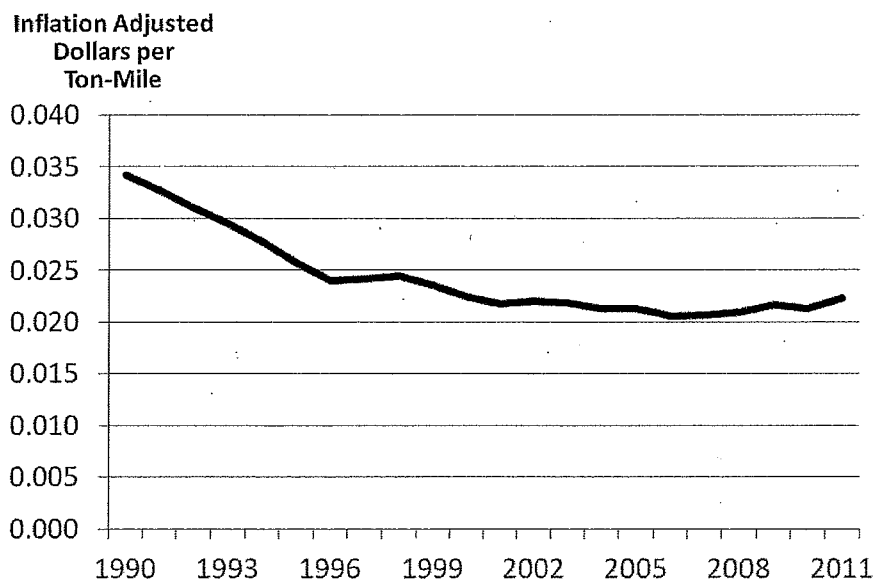
105. See, e.g., Mark Burton, *The Economic Regulation of US Railroads: Understanding Current Outcomes and Deliberating a Future Course*, 78 J. TRANSP. L., LOGISTICS & POL'Y 271, 275 (2011).

106. Diana G. Carew & Michael Mandel, *U.S. Investment Heroes of 2013: The Companies Betting on America's Future*, PROGRESSIVE POL'Y INST. 5-6, 10 (Sept. 2013), http://www.progressivepolicy.org/wp-content/uploads/2013/09/2013.09-Carew-Mandel_US-Investment-Heroes-of-2013.pdf.

107. See generally *Annual Report Financial Data*, SURFACE TRANSP. BD., <http://www.stb.dot.gov/econddata.nsf/f039526076cc0f8e8525660b006870c9?OpenView> (last visited Jan. 11, 2015). The benefits of such investment accrue broadly not only by enhancing productivity in the rail industry, but also by advancing social goals. For example, the more than \$10 billion invested in new locomotives since 1998 has led to an accelerated fleet modernization, with concomitant reductions in fuel consumption (about half) and pollutants (about four times fewer) than similar fleets a generation ago. The Annual Reports (Form R-1) include the following schedules: Loco CapX Schedule 330, Fuel Consumption Schedule 750, and Revenue Ton-Miles Schedule 755. See also U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-07-94, *FREIGHT RAILROADS: INDUSTRY HEALTH HAS IMPROVED, BUT CONCERNS ABOUT COMPETITION AND CAPACITY SHOULD BE ADDRESSED* 57-58 (2006) (describing more generally the spillover benefits of such investments).

Another efficiency metric is provided by the cost of moving a ton of freight. Figure 11 indicates that the combination of the efficiency-enhancing capital expenditures seen in Figure 10 together with other managerial-enacted factors have reduced inflation adjusted costs significantly from the early Post-Staggers years, and have maintained such costs over the past decade.

FIGURE 11.— REAL OPERATING COST PER TON-MILE



Source: STB Annual Report Form R-1 Schedule 210 and Schedule 410 of Individual Railroads (see <http://www.stb.dot.gov/econdata.nsf/f039526076cc0f8e8525660b006870c9?OpenView&Start=1&Count=300&Collapse=1#1>)

Yet another indicator of the efficiency of the rail transportation system is reflected railroad rates. Figure 12 reports prices (nominal rail revenue per ton-mile) adjusted by two alternative wholesale cost indices. The first measure uses the producer price index—a broad measure of wholesale price changes—and indicates real rail rates have risen somewhat since 2000 but remain significantly below 1990 levels (which are, in turn, lower than 1980 levels¹⁰⁸). The second measure uses a more targeted calculation of real rail rates via the statutorily-mandated Rail Cost Adjustment Factor (RCAF) and indicates an even more pronounced real rate reduction over the years. While rate increases and decreases are normal market elements, it is nonetheless encouraging that the govern-

108. See Jerry Ellig, *Railroad Deregulation and Consumer Welfare*, 21 J. REG. ECON. 143, 151 (2002).

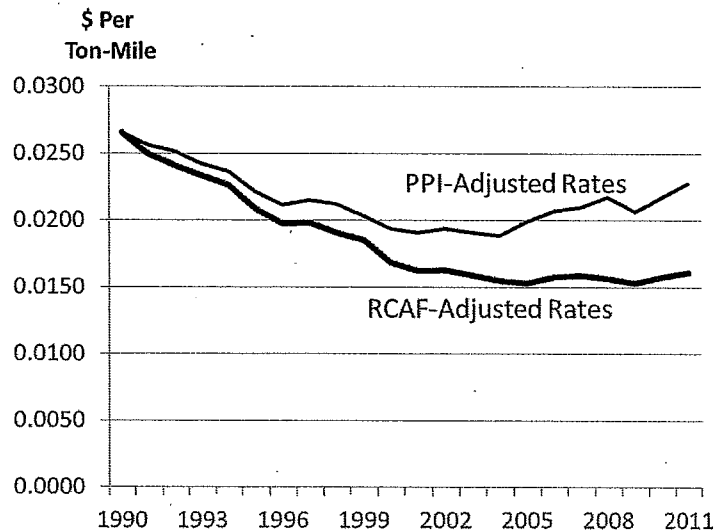
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ance structure created by Staggers has witnessed an increasing value of American rail services.

FIGURE 12 – INFLATION-ADJUSTED RAILROAD RATES



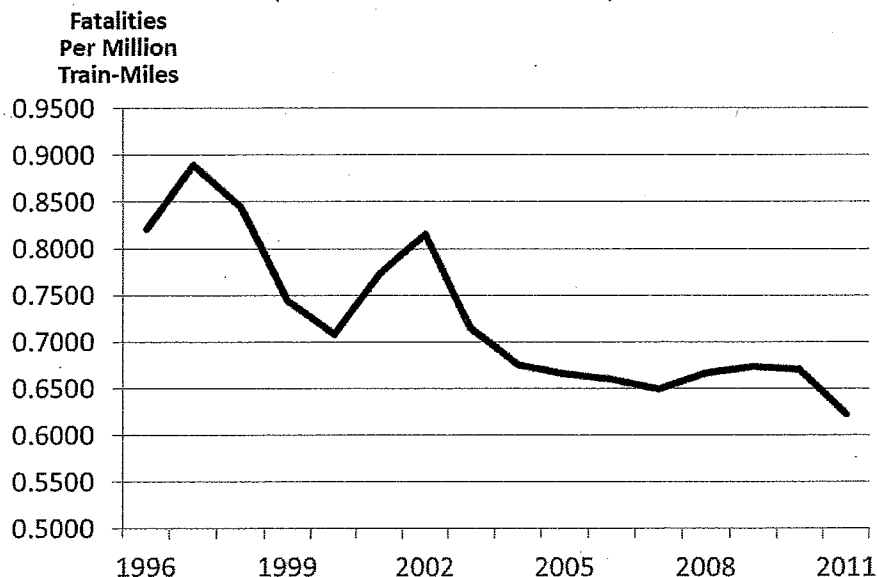
Nominal rates reflect annual averages across all rail shipments as reported to the Interstate Commerce Commission (or STB). RCAF rates were deflated through application of the Railroad Cost Adjustment Factor (RCAF), as developed by the Interstate Commerce Commission (or STB). PPI rates were deflated through an application of the Producer Price Index (All manufacturing industries, annual values) as reported by the Bureau of Labor Statistics.

Source: STB Annual Report Form R-1 Schedule 210 and Schedule 755 of Individual Railroads (see [http://www.stb.dot.gov/econdata.nsf/f039526076cc0f8e8525660b006870c9?OpenView&Start=1&Count=300&Collapse=1#1](http://www.stb.dot.gov/econddata.nsf/f039526076cc0f8e8525660b006870c9?OpenView&Start=1&Count=300&Collapse=1#1))

A final non-financial indicator that revenues have been adequate to provide for a “safe and efficient rail transportation system,” as stated in the Staggers Act, is depicted in rail-related fatalities. Figure 13 shows that from 1996-2011, overall rail-related fatalities across all groups of people, including employees and passengers, scaled by the number of train miles fell by 24 percent. The corresponding decrease in fatalities for railroad employees was over 30 percent.¹⁰⁹

109. See Bureau of Transp. Statistics, *National Transportation Statistics*, U.S. DEPT OF TRANSP., http://www.rita.dot.gov/bts/sites/rita.dot.gov/bts/files/publications/national_transportation_statistics/index.html (follow “Chapter 2 – Transportation Safety” hyperlink; then follow “Section A - Multimodal, Table 2-1” and “Table 2-7” hyperlinks).

FIGURE 13 - ALL NON-GRADE CROSSING FATALITIES
(PER MILLION TRAIN MILES)



Includes Employees, Passengers, and Others Except for Grade-Crossing Casualties

Source: USDOT, Bureau of Transportation Statistics, National Transportation Statistics, Table 2.1.

In summary, it is clear that the Staggers-based governance structure and resulting revenues, which rely to the maximum extent possible on market-based transactions rather than granular regulation to allocate railroad resources, have successfully promoted a safer and more efficient rail transportation system.

VII. POLICY IMPLICATIONS

In 1966, Clint Eastwood starred in a spaghetti-Western whose details are long forgotten but whose title, "The Good, The Bad and The Ugly," has survived and is generally well-known. The title not only evokes the indelible image of Clint Eastwood draped in a Mexican poncho chomping on a half-smoked cigar, but also provides a particularly apt taxonomy for the policy prospects for revenue adequacy.

A. THE GOOD

As originally conceived the concept of revenue adequacy had (and still has) the potential to provide two "good" functions. First, if properly measured and interpreted, the metric can convey useful information on

an important economic dimension of the railroad industry. In particular, given the critical role of the industry for facilitating and promoting commerce, knowledge of the industry's financial health may prove useful in any policy discussions of the larger state of the economy. A healthy rail industry is likely to be a catalyst for economic growth in a number of industries that rely on rail transport to deliver their goods to markets. In the late 1970s when the concept of revenue adequacy was fashioned, the industry was suffering from both physical and financial infrastructure deterioration.¹¹⁰ The result was not only poor financial returns to investors (leading to diminished ability to attract financial capital), but also poor service and safety performance that were well documented.¹¹¹ While not a cure-all, adequate revenues were then seen—and may still be usefully seen—to be the life-blood for enabling the industry to attract capital and to provide high quality services.¹¹²

Second, and related, should the metric of revenue adequacy indicate widespread shortfalls across a number of firms for a protracted period, policymakers may properly raise questions regarding the appropriateness of policy governance of the industry.¹¹³ Given the clear consumer demand for high quality rail services in the United States and the potential efficiencies of rail transport for a host of goods traveling to markets throughout the world, widespread and protracted indications of revenue inadequacy may provide a signaling value of a flawed governance structure for the industry. This certainly was the case for the rail industry in the 1970s. Aside from a variety of other indicators of economic failure, early calculations by the ICC revealed that revenue inadequacies were widespread.¹¹⁴ This metric, together with other readily observable metrics of economic failure, provided a powerful message to Congress that

110. See *Regulation: From Economic Deregulation to Safety Regulation*, FED. HIGHWAY ADMIN. 3 (2009), available at http://www.tampabayfreight.com/pdfs/Freight%20Library/nov2009/08_FrmEconDeregToSaftyReg.pdf.

111. *Id.* at 4-5.

112. See U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-08-218T, FREIGHT RAILROADS: UPDATED INFORMATION ON RATES AND OTHER INDUSTRY TRENDS 4-5 (2007) (statement of JayEtta Z. Hecker, Director, Physical Infrastructure Issues).

113. At the outset of the determination of the concept of revenue adequacy, it was recognized that its "attainment depends upon enlightened government action in all areas that affect the health of the Nation's railroads." These governance tools were seen to include, for example, legislation, eliminating discriminatory taxation, requiring alternative transportation modes to bear an economic share of the highway and waterway costs which are incurred by the public for to support these modes, and reducing regulation "to the level that is genuinely necessary to protect the public interest." See, e.g., *Adequacy of Railroad Revenue (1978 Determination)*, 362 I.C.C. 199 (1979); *ICC Ratemaking in Noncompetitive Markets—Oversight: Hearing Before the Subcomm. on Oversight & Investigations of the H. Comm. on Interstate & Foreign Commerce*, 96th Cong. 58, 68 (1980).

114. *ICC Ratemaking in Noncompetitive Markets—Oversight: Hearing Before the Subcomm. on Oversight & Investigations of the H. Comm. on Interstate & Foreign Commerce*, 96th

the long-standing policy of granularly regulating rail rates was economically harmful and a more market-oriented system of directing railroad resources was warranted. Increases in the measures of revenue adequacy following the Staggers Act have been slow but these improvements properly can be taken [together with other economic metrics]¹¹⁵ as signals to policymakers that the Post-Staggers governance structure has proven successful.¹¹⁶

B. THE BAD

Revenue adequacy was meant as a tool for informing regulators and the larger public about the financial health of the industry (and therefore the prospects of fulfilling the goals of the Staggers Act). The passage of time has permitted a (sometimes less than) subtle morphing of revenue adequacy from a measure capable of benchmarking railroad industry health into a back-door regulatory tool, which creates the prospect of “bad” policy. This is not to say that regulatory oversight of the industry is *per se* bad. To be sure, while competition for rail shipments is widespread through inter-modal and intra-modal alternatives, particular circumstances require regulation to ensure captive shippers are not exploited. The necessity for this residual regulation should not be permitted to extend its reach beyond the minimal amount necessary to fulfill the Staggers Act’s goals.¹¹⁷

The morphing of revenue adequacy from an instructive metric to a regulatory tool, however, has proceeded over several years without serious notice or awareness of these potential consequences. As early as the introduction of the “Revenue Adequacy” constraint in 1985, the possibility emerged that railroad profitability (as judged by the revenue adequacy measure) may be used as a trigger for determining the reasonableness of rates on particular rail shipments.¹¹⁸ While this potential regulatory constraint had relatively little practical effect when it was introduced because

Cong. 58, 69 (1980). The first assessment of revenue adequacy by the ICC found 23 Class I railroads faced inadequate revenues.

115. See *supra* Part IV.

116. Even prior to the passage of the Staggers Act, economists recognized the valuable signaling role that profitability measures (such as provided by revenue adequacy calculations) might play as early indicators of the financial health of the industry. See, e.g., Altman, *supra* note 15, at 194.

117. See Staggers Rail Act of 1980 § 101, Pub L. No. 96-448, 94 Stat. 1897 (codified as amended at 49 U.S.C. 10101(a)(1) (2014)) (stating that it is the policy of the United States “to allow, to the maximum extent possible, competition and the demand for services to establish reasonable rates for transportation by rail”).

118. See Coal Rate Guidelines, Nationwide, 1 I.C.C.2d 520, 535 (1985) (stating that “[c]arriers do not need greater revenues than this standard permits, and we believe that, in a regulated setting, they are not entitled to any higher revenues.”).

of the widespread “revenue inadequacies” at the time, the prospect for this construct to be turned into a binding regulatory constraint has become significantly more likely as railroads are increasingly deemed revenue adequate. More recently, STB introductions of regulatory mechanisms, such as RSAM and the R/VC Limit Price Test, exacerbate the potential linkage for specific regulatory constraints to turn directly upon the observed financial health of particular railroads.

If the STB were to explicitly allow the revenue adequacy concept to evolve from a primarily information-producing role into an active and ongoing regulatory constraint, it would represent a significant expansion of rail industry regulation. However, the linking of regulatory constraints to observed accounting profit measures, such as those captured in the revenue adequacy metric, lacks economic foundations.¹¹⁹ Even if COC_I is counterfactually assumed to represent a social ideal, moreover, history provides a clear indication that the imposition of such rates through regulatory fiat is extremely costly and laden with harmful side effects when applied in the rail industry. While it is tempting to pit an idealized notion of regulatory outcomes against observed market imperfections, the actual choice that policymakers must confront is rooted in the reality that *both* markets and regulation are imperfect governance structures.¹²⁰ From this perspective, policymakers should appropriately be wary of introducing expansive regulatory tools in situations where market-based governance is producing palatable economic outcomes. This perspective is especially true in industries, such as railroads, in which the costs of poor regulatory design have been made so apparent.

C. THE UGLY

While an inadvertent morphing of the concept of revenue adequacy from an information-producing role into a regulatory capacity creates the prospect for bad policy, a truly “ugly” prospect for revenue adequacy also emerges from an examination of the evolution of rail industry regulation. The end aim of revenue adequacy has at times been interpreted to be an explicit limitation on the ability of firms to earn economic profits. For instance, in the Coal Rate Guidelines, the ICC declared a desire to use the concept of revenue adequacy as a regulatory vehicle to explicitly constrain the profits of railroads to be, as an upper bound, the industry-wide cost of capital:

Carriers do not need greater revenues than . . . [the Revenue-Adequacy level which equals the industry-wide cost of capital] . . . and we believe that,

119. See *supra* Part IV.

120. For an extended discussion of this point, see John W. Mayo, *The Evolution of Regulation: 20th Century Lessons and 21st Century Opportunities*, 65 FED. COM. L. J. 119 (2013).

in a regulated setting, they are not entitled to any higher revenues. Therefore, the logical first constraint on a carrier's pricing is that its rates not be designed to earn greater revenues than needed to achieve and maintain this "revenue adequacy" level. Our concept is simply that a railroad not use differential pricing to consistently earn, over time, a return on investment above the cost of capital.¹²¹

In the Non-Coal Guidelines, the STB later states "the statutory objective is for railroads to attain *only* the level of revenues that would be adequate" ^{122,123}

Our reading of the Staggers Act and its legislative history finds no such congressional intent to restrict railroads' earnings to be only those deemed adequate.¹²⁴ As noted, the cost of capital upon which the revenue adequacy concept is predicated serves in competitive markets as a minimal floor for successful firms.¹²⁵ Firms operating in competitive markets routinely aspire for greater earnings, and indeed, it is this aspiration that compels such firms to a number of salubrious behaviors including cost reductions, productivity enhancements, quality of service enhancements, and so on. As shown in Section V, firms across the country—in a variety of industries and over extended periods of time—can and do generate adequate revenues without the need for profit-based regulation.

In contrast, were regulators to utilize the revenue adequacy provisions of the Staggers Act to constrain rates with the purpose of limiting railroads' profitability to be only equal to the industry cost of capital, profound economic incongruities and problems would arise. One of these problems is the creation of a knife-edge turning point between the clear Congressional mandate for regulators to "assist" carriers in achieving adequate revenue levels and a regulatory policy to ensure that rail-

121. See Coal Rate Guidelines, Nationwide, 1 I.C.C.2d 520, 535-36 (1985).

122. Rate Guidelines—Non-Coal Proceedings, S.T.B. Ex Parte No. 347 (Sub-No. 2), 1 S.T.B. 1004, 1027 (Dec. 27, 1996), available at [http://www.stb.dot.gov/boundvolumes1.nsf/b466c97893ec3be08525680b006041bd/c0a8aec7a80eae68525681100622402/\\$FILE/47.pdf](http://www.stb.dot.gov/boundvolumes1.nsf/b466c97893ec3be08525680b006041bd/c0a8aec7a80eae68525681100622402/$FILE/47.pdf) (emphasis added).

123. Similar calls for links between the regulatory governance structure and the financial profitability of railroad appears in other venues as well. See STAFF OF S. COMM. ON COMMERCE, SCI., & TRANSP., 113TH CONG., UPDATE ON THE FINANCIAL STATE OF THE CLASS I FREIGHT RAIL INDUSTRY (Nov. 21, 2013), http://www.commerce.senate.gov/public/?a=Files.Serve&File_id=3cflb5f2-9487-4c9c-9cea-efb9eb5499d7 (stating "[i]f the railroad industry is now proving to be financially viable for the near and long term, policymakers will need to consider whether regulatory changes are in order to make sure the industry does not enjoy unfair advantages.").

124. See generally STAFF OF S. COMM. ON TRANSP. & COMMERCE, 95TH CONG., 1ST SESS., CONGRESSIONAL SYMPOSIUM, RAILROADS—1977 AND BEYOND: PROBLEMS AND PROMISES III (Comm. Print 1977); RAILROAD TRANSPORTATION POLICY ACT OF 1979: REP. ON S.1946 TO REFORM THE ECONOMIC REGULATION OF RAILROADS, AND FOR OTHER PURPOSES, S. REP. NO. 96-470 (1979); RAIL ACT OF 1980: REP. ON H.R. 7235 TO REFORM THE ECONOMIC REGULATION OF RAILROADS, AND FOR OTHER PURPOSES, H.R. REP. NO. 96-1035 (1980); Staggers Rail Act of 1980, Pub L. No. 96-448, 94 Stat. 1895 (1980) (codified in scattered sections of 49 U.S.C.).

125. See *supra* Part III.

roads are unable to earn anything more than exactly this level. Such an interpretation of revenue adequacy appears to be directly contrary to the aim of the Staggers Act to rely upon (1) competition and market forces to the maximum extent possible; and (2) regulation to the corresponding minimum extent necessary to accomplish the goals of the Act. Aside from arguably “going off the tracks” laid out by Congress, such a policy is troubling from an economic perspective for several reasons.

First, such a policy ignores the economic reality that the vast majority of rail traffic faces competition with other railroads, other transportation service alternatives, and other geographic and product alternatives. As recognized by Congress—and widely embraced throughout the US economy—such market-based allocation drives firms to reduce costs, innovate, and more generally, better serve the U.S. economy. Firms do not undertake these activities for altruistic reasons but for the pursuit of economic profits in excess of the firm’s cost of capital. Regulatory policies that restrict firms to only earn the industry cost of capital effectively eliminate profit motives that drive innovative, cost-reducing and value-enhancing activities. Regulatory policies that are more concerned with protecting competitors—rather than protecting competition—through notions of equity or fairness between carriers and between shippers and receivers have similar deleterious effects. Indeed, this is exactly the sort of regulatory regime that existed prior to the Staggers Act and which, in hindsight, is universally regarded as a principal source of the physical and financial deterioration of the industry in the 1970s.

The foundation of such a policy also errs in presuming that the source of returns in excess of adequate levels is differential pricing of dominant routes, when, in fact, the such profits may arise from a variety of sources. This prospect creates the potential for regulation to substantially misalign incentives in the industry. Suppose a firm reduces its costs of providing service for a set of shipments that are not subject to regulatory review (because their prices are less than 180 percent of their variable costs). When a firm is at or near the revenue adequacy threshold, the consequence of this otherwise desirable cost reduction would be the prospect of an enhanced regulation of shipments that are within the regulators’ purview. That is, efficiency enhancements would be “rewarded” by compensating increases in regulation. Similar “rewards” would emerge from innovations that enhance consumer demand, reduce product-specific or firm-wide fixed costs, or even reduce *any* shipment-related costs. In these instances, the regulatory structure creates perverse incentives to avoid such efficiency enhancements. For instance, consider the prospect of a firm-wide innovation that could be introduced immediately or, alternatively, introduced more slowly. With profit regulation operating as a binding constraint, the firm may benefit (though society will be harmed)

by "slow-rolling" the introduction of the innovation.¹²⁶

Finally, such a policy is neither efficiently targeted nor free of regulatory costs. That is, the regulatory tool of profit-based regulation applies a "dull axe" of firm-wide profit-triggered regulation to a far more specific issue of residual market power abuses on specific shipments. Apart from the perverse incentives created by such a policy, this profit-based regulation has proven to be sufficiently costly in a variety of industries to warrant substantial movement away from this tool over the past quarter century.¹²⁷

VIII. CONCLUSION

Congress in 1980 declared that the goals of the Staggers Act were to: (1) assist the railroads in rehabilitating the rail system; (2) reform Federal regulatory policy to preserve a safe, adequate, economical, efficient and financially stable rail system; (3) assist the rail system to remain viable in the private sector of the economy; (4) provide a regulatory process that balances the needs of carriers, shippers and the public; and (5) assist in the rehabilitation and financing of the rail system.¹²⁸ It is possible to state in 2014 that the governance structure established by the Staggers Act has been successful in accomplishing these goals. The rail industry is healthy, with benefits flowing to both rail carriers and shippers alike, as well as to the larger economy. With these benefits in-hand, some industry observers have implicitly, if not explicitly, suggested that the industry's financial progress should presage policy reconsiderations, if not reformulations. This perspective essentially argues that the Staggers Act has been too successful, and that now, with a financially stable industry that is increasingly earning "adequate" revenues, it may be possible to use that "adequacy" as a trigger for enhanced regulation.

In this paper, we examine the concept of revenue adequacy with an economic lens by exploring the origins of revenue adequacy, the evolution of the concept, its practical applications and its prospects. We find that the concept was in the first instance, well-motivated by the dire financial situation facing the rail industry in the 1970s, and that the concept was designed to serve as a benchmark for assessing the ability of the evolving regulatory structure in the post-Staggers industry to assist rail carriers in achieving financially secure footing.¹²⁹ From this relatively

126. See, e.g., George Sweeny, Adoption of Cost-Saving Innovations by a Regulated Firm, 71 AM. ECON. REV. 437, 437 (1981).

127. See, e.g., Michael A. Crew & Paul R. Kleindorfer, Incentive Regulation in the United Kingdom and the United States: Some Lessons, 9 J. REG. ECON. 211 (1996).

128. Staggers Rail Act § 3.

129. See *supra* Part III. This interpretation is also congruent with that of the GAO, which notes "Congress established the concept of revenue adequacy as an indicator of the financial

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straightforward beginning, revenue adequacy has subtly morphed from an informative concept into a regulatory tool. Beyond a deviation from the original legislative intent of the concept, we find that this transition is unwarranted on both conceptual and practical grounds. Moving forward, we argue that policymakers have the opportunity to use revenue adequacy as an instrument for good, bad or ugly policy. Revenue adequacy calculations can provide “good,” useful, information on the financial health of the U.S. rail industry, a vital infrastructure industry supporting the larger economy. If permitted to drift in the direction of creating additional links between railroads’ general profitability and regulatory stringency, however, the use of revenue adequacy will create the real prospect of “bad” or even outright “ugly” economic consequences.

health of the industry.” See U.S. GOV’T ACCOUNTABILITY OFFICE, GAO-07-94, FREIGHT RAILROADS: INDUSTRY HEALTH HAS IMPROVED, BUT CONCERNS ABOUT COMPETITION AND CAPACITY SHOULD BE ADDRESSED 1, 7 (2006) (emphasis added).

APPENDIX – CALCULATING ROI WITH COMPUSTAT DATA

For the STB, the computation of ROI (the numerator in revenue adequacy) is determined by dividing Adjusted Net Railway Operating Income (line 5 of Schedule 250) by the average Net Investment Base (line 13 on Schedule 250, average of beginning and ending year). Using COMPUSTAT (data codes are shown in *italics*), we attempt to estimate this calculation for a broad array of companies operating in the United States for 2001-2012. Our estimate of line 5, Adjusted Operating Income is earnings before interest and taxes less total taxes.

$$\text{Adjusted Operating Income} = \text{EBIT} - \text{TXT}$$

Our estimate of line 13, Net investment Base, is Net property plant and equipment plus working capital minus deferred income tax credits (which are set to zero if missing). Working capital allowed needs to be calculated similarly to how it is calculated on line 28 of schedule 245. Working capital allowed is the minimum of [cash on hand, cash allowed], plus inventory. Minimum cash allowed is computed as days of working capital required multiplied by average daily expenses. The calculation using COMPUSTAT data codes is shown below:

Net Investment Base = *PPENT* + minimum(*CHE*, allowed cash) + *INVT* - *TXDITC* where allowed cash =

$$\left\{ \left(\frac{\text{RECT}}{\text{SALE}/360} + 15 \right) - \left(\frac{\text{AP}}{\text{XOPR}/360} \right) \right\} \times \text{XOPR}/360$$

Figure A.1 shows how close our measure is to the STB calculation for each of BNSF Railway, Union Pacific Corp, and Norfolk Southern Corp, CSX Corp, and Kansas City Southern. Overall, our measure comes relatively close to matching the STB for BNSF Railway and Union Pacific Corp., where with the exception of a single year, our measure is always off by less than one percentage point. The measure also works well for Norfolk Southern Corporation in the recent years, but less so in the early period. The methodology less closely produces a match to the STB methodology for CSX and Kansas City Southern. However, it is important to note that our calculation of ROI appears to be systematically higher than the STB. Thus, any bias this introduces would tend to make Class I railroads more profitable than the STB measure, and as such, our analyses would tend to overestimate the profitability of the railroad industry.

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FIGURE A.1
DIFFERENCES IN ROI: COMPUSTAT MINUS STB IN BASIS
POINTS, BY FIRM 2000–2012

